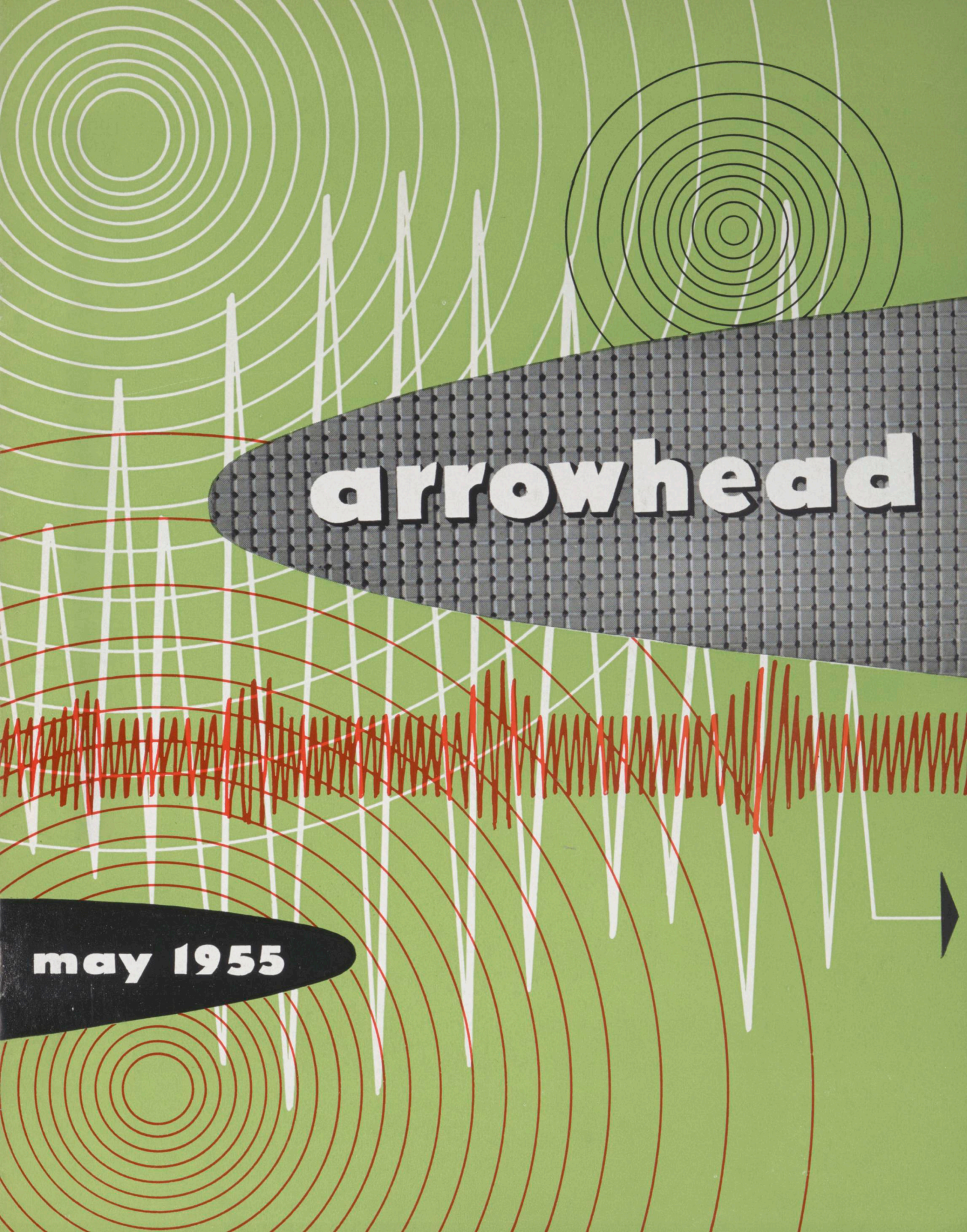

arrowhead
may 1955

THIS strange and beautiful shape that seems to have alighted from outer space among the rugged mountains of New Zealand is the 144-foot diameter dome of the Kawerau reservoir.

Made of 2½-inch pre-stressed concrete, capable of carrying a distributed load of 30 lbs. to the square foot, it has less thickness in relation to diameter than an egg shell.

It is a dome that would evoke the envy of Michael Angelo but in his age it could never have been constructed. Only today's engineering techniques could achieve such remarkable tensile strength and grace. The reservoir was built in pre-stressed concrete by the Preload Division of Fletcher Construction Company and the method is described in this issue.

arrowhead

There is nothing new under the sun. Many "new" things are merely refinements of old ideas forgotten and re-discovered, or just brought up-to-date.

It is 100 years since the first reinforced concrete building was demonstrated at the Paris Exposition. The building had a 20-ft. span roof made with 12-inch concrete reinforced by plain round bars. Compare this with the light but infinitely stronger pre-stressed shell of the reservoir seen on the opposite page.

Further back in history, the Romans were building solid concrete domes that still survive, and before them the ancient Greeks had theatres with better acoustics than most of our modern cinemas. The famous La Scala Opera House, built in 1778, is so perfect acoustically that, when it was restored after the bombing of Milan, they were afraid to tamper with Piermarini's original design. But it is not known whether he was history's greatest master of acoustical science or the luckiest.

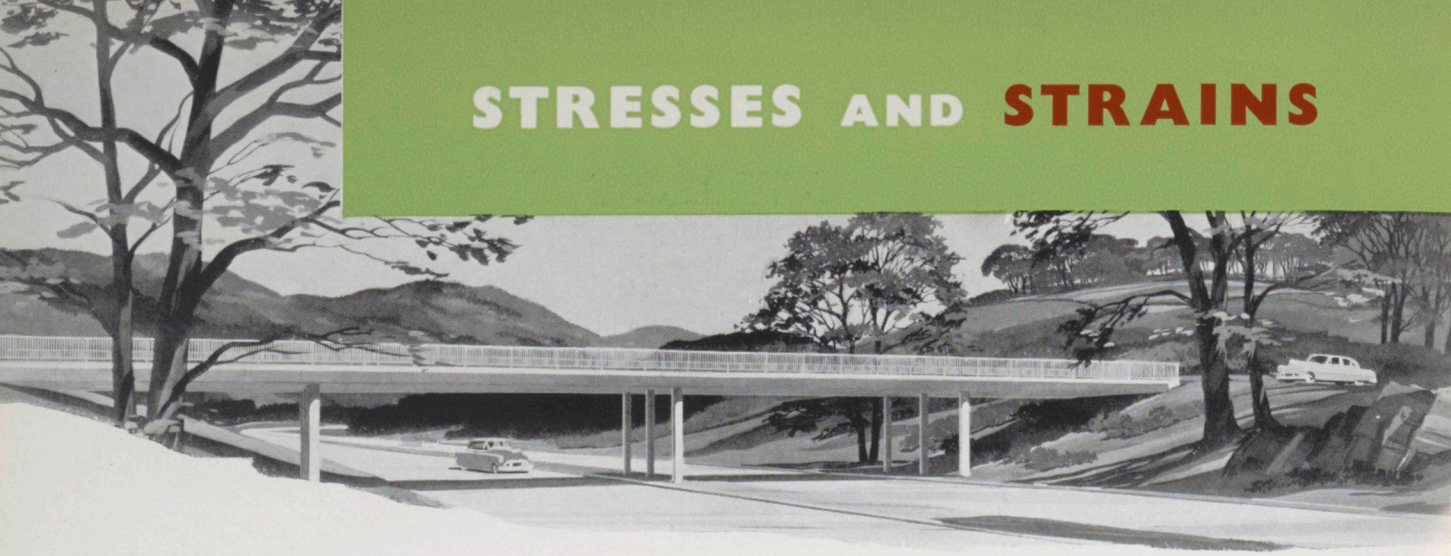
The two main topics in this issue of *Arrowhead* are pre-stressed concrete and acoustic engineering. Fletchers have Divisions and technical staff competent to carry out this type of work for architects and building clients who want the highest standards without extravagance.

VOLUME ONE : NUMBER FOUR : PUBLISHED EVERY TWO MONTHS BY

FLETCHER HOLDINGS LIMITED

AUCKLAND, NEW ZEALAND

STRESSES AND STRAINS



An introduction into prestressing of concrete

To the man in the street concrete appears to be one of the hardest and least resilient of materials. However, to the engineer or under the microscope it is like all other materials in that it is elastic and subject to movement, even when thoroughly set and dry.

The stresses and strains to which concrete is subject are illustrated by observing the behaviour of a material which is obviously elastic: what the eye can readily see in a flexible material like rubber is an exaggeration of how concrete behaves. The evidence is not visible until cracks appear.

Take an ordinary pencil rubber: if you bend it with your fingers the outside face of the bent rubber is stretched or elongated and the inside is compressed or contracted. Exactly the same thing happens with other materials but, with a more rigid substance like an iron bar, the deformation is not apparent.

Concrete is capable of resisting compression (squeezing together), and a concrete pillar, for example, resting on a solid foundation will stand up to tremendous pressure exerted from the top of the pillar. Its ability to resist tension (forces pulling against each other), however, is relatively weak, so that the same pillar of concrete laid horizontally and supported at each end will crack or even break if a heavy load is placed on it. If the load is not heavy enough to break it and is removed after a short period, recovery is almost instantaneous but under sustained load conditions the strain increases without the increase of stress, and this additional amount of strain remains after the stress is removed.

In conventional reinforced concrete the purpose of the steel bars or rods is to take tensile stresses. However, there are limitations to what can be done with reinforced concrete, particularly in the case of long beams, which have to be supported at fairly frequent intervals by load-carrying columns. Reinforced concrete is also wasteful in the sense that often less than 50% of the concrete area is under compression, and a large proportion can be considered as superfluous. This is not to suggest that all reinforced concrete structures are wasteful — many other factors enter into alternative designs which influence total costs and the plant and material required.

The basic idea of pre-stressing is to produce a member which is, by the manner of its construction, already in a state of internal stress **before** the actual load is applied. These stresses are, however, of the opposite sense to the stresses which will result from the application of dead and alive loads, and are thus calculated largely to cancel them.

Since concrete is weak in tension, and cracking occurs at comparatively low stress, it is desirable to avoid tension. In the case of a simply-supported, pre-stressed beam, the lower portion is placed in a state of compression and subsequent loading will not produce tension until the pre-compression has been neutralised.

The assumption is that concrete is not capable of taking any tension at all, and rather than have tensile stresses develop, they are eliminated by compressing the concrete with very strong wires set in the concrete and anchored at the ends.

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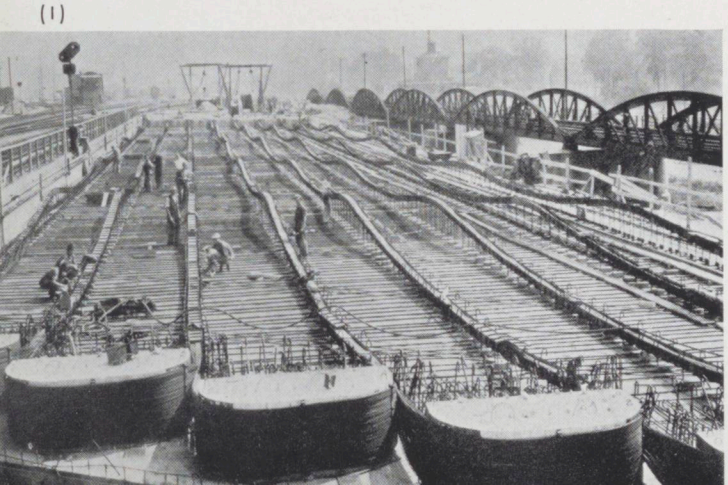

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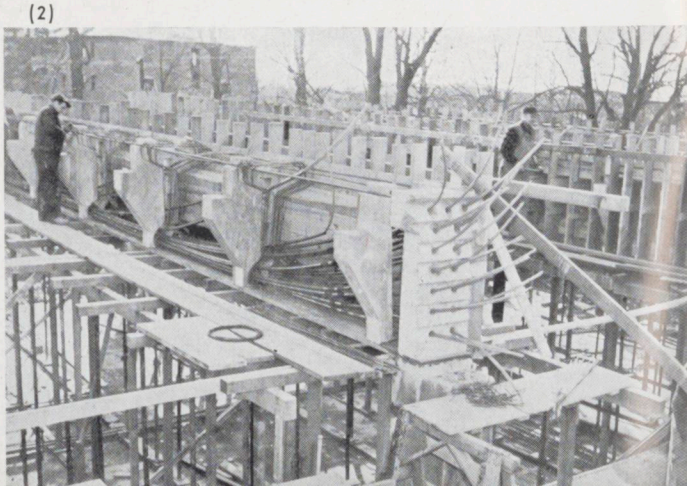


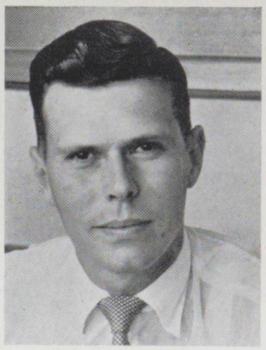
There are two main methods by which reinforced concrete beams are pre-stressed:

Pre-tensioning: The reinforcement, placed in position between the moulds is stretched by jacks thrusting against specially constructed abutments or against the moulds themselves. The concrete is then poured, embedding the stretched wires which are kept in tension until the concrete has hardened sufficiently to withstand the stresses which will result when the jacks are released. On releasing the jacks and anchors, the steel is prevented from returning to its unstretched condition because of the bond between the wire and the concrete. This is known as the pre-tensioning method.

Post-tensioning: In this case the concrete does not adhere initially to the steel, which is in the form of cables encased in a sheath. The concrete is cast in the mould, and when it is sufficiently hardened the steel is then stretched and anchored to the concrete. This is known as the post-tensioning method. Most pre-stressing systems are based on one or another of the above methods.

Pre-stressing is a relatively new medium which enables engineers and architects to design and build structures which formerly would not have been attempted in normal reinforced concrete. It was on the Continent and in Great Britain that linear pre-stressing had its origins, but is was the U.S.A. that forged ahead with circular structures and translated the theory into practicable construction techniques.

In the case of a cylindrical tank or barrel, when it is filled with water the fluid pressure subjects the cylindrical wall to direct tensile stress. If steel bands are placed and tightened round the outside of the tank while still empty, the wall is compressed inwards. If the



M. J. DIJKMANS—Manager

PRELOAD

Fletchers' Preload Division operates from its own office at 88 Nelson Street, Auckland, just over the road from the Vulcan Works. The Manager is M. J. Dijkmans (see October issue of *Arrowhead*), and his two assistant Engineers are Don Wilson and Bob Foster. Adrian Kooiman looks after the accounts and field administration and L. Guise is the Field Supervisor.

Originally known as the Preload Central Corporation when it was wholly owned by the Preload Company Incorporated of New York, it is now known as the Preload Division of The Fletcher Construction Company Limited. Apart from royalty payments for patent rights, the Preload Division is completely independent from the U.S. Company, but in order to maintain its standard of design and to be kept in touch with the latest developments, Preload's New Zealand designs are still checked in New York.

Over 1,000 reservoirs ranging from half a million gallons to ten million gallons capacity have been built under Preload patents all over the world, 750 of them in the U.S.A. In New Zealand, Preload has built reservoirs at Henderson, Waharoa, Kerepehi, Kawerau (two) and Wellington and others are under construction at Taumarunui and Whangarei.

Preload has the contract for a large wool store for Dalgety & Company in Hamilton, also the contract for the decking of the 625-foot Nelson Street Viaduct, in Auckland.

Official address: 88 Nelson Street, Auckland. Telephone: 44-488. Postal address: P.O. Box 2983.

R. J. FOSTER—Engineer

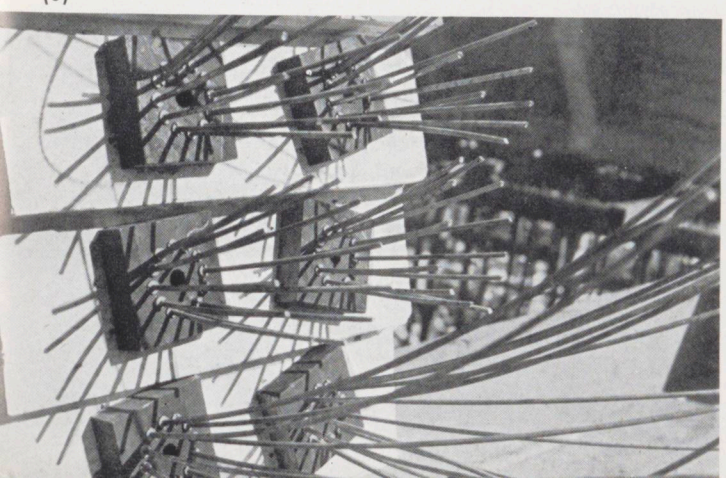
(1) This is the Leonhardt system as used on the Heilbronn Railway bridge. The big end anchor blocks are moved by heavy jacks not shown in the photograph. All the wires can be stretched in one single operation with very considerable savings in stressing costs.

(2) Preload girders for Manhattanville College, U.S.A. Note how the wires are concentrated at the bottom centre of the girder to achieve maximum compression so as to take up any tensile stresses which may be developed after loading.

(3) Typical Preload anchor plates which will be used extensively in Preload linear work in New Zealand.

(4) Panels stretched on the Preload Crom system for a U.S. Navy warehouse. The Crom system eliminates the use of end anchorages and will shortly be introduced by Preload into New Zealand.

(3)

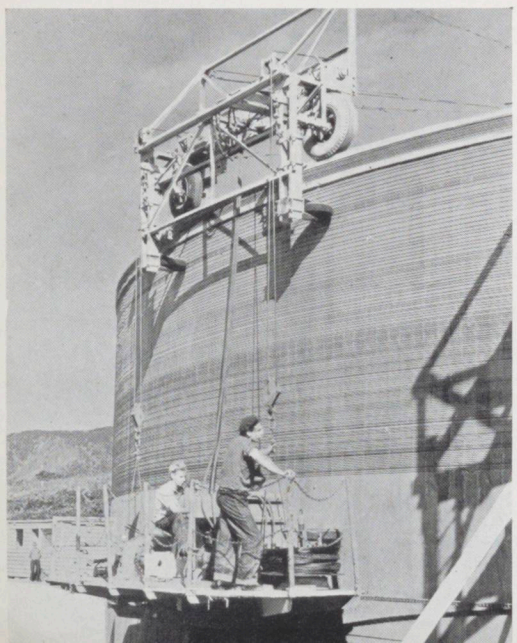


(4)

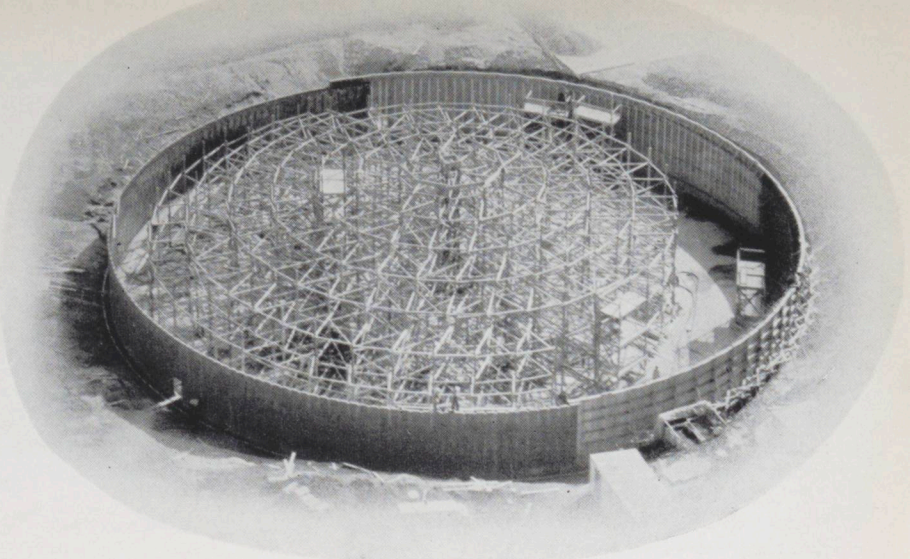
tension on the outer bands were exactly equal to the tension which, without the aid of steel bands, would have been produced in the circular wall by the pressure of the liquid when the tank is filled, the wall would be free from stress. In practice, however, engineering calculations are made to minimise and not neutralise the stresses. This principle has been highly developed for the construction of reservoir and liquid carrying structures, and the winding of the wire around the structure can be clearly seen in the photograph of the Upper Hutt reservoir, one of the many New Zealand contracts carried out by Preload.

Because the maximum use is made of the concrete in pre-stressed work, considerable savings are possible in concrete and steel. In circular reservoirs and tanks, steel savings up to 80% and concrete savings up to 50% can be effected. With beams, girders and slabs, the savings are up to 50% of steel and 25% of concrete. This suggests that pre-stressed work is a lot cheaper than orthodox construction, however, the labour cost per cubic yard of concrete is higher, although in many cases the material savings offset this extra cost. Another important factor is that pre-stressed work can generally be constructed in a shorter time, thus reducing overhead costs.

It stands to reason that within the general field of pre-stressing there are a variety of methods used by operators, but all involve the same basic principle. Whereas many of these systems are protected by patent rights, in general most



A Preload "Merry-go-round" on the Upper Hutt half-million-gallon reservoir. Tension in the wire is achieved by pulling it through a die while the machine pulls itself along an endless chain tightly held against the wall.



The one-and-a-half-million gallon reservoir for the Tasman Pulp and Paper Company Limited at Kawerau. This tank has an internal diameter of 144 feet and a dome thickness of 2½ inches. It was constructed in six months.

of the restrictions cover types of anchorages, winders and specialised equipment such as Preload's "Merry-go-round" (a special machine driven by a petrol engine which can revolve round a tank or reservoir wrapping it with high tensile steel wire).

The best known companies or systems specialising in pre-stressing are Preload, Freyssinet, Lee-McCall, Hoyer, Magnel-Blaton and Leonhardt. Incidentally the Lee-McCall system is used extensively by Preload in U.S.A.

Preload with its world-wide organisation owns or controls more valuable patents than any other single group, and their systems of wrapping reservoirs and tanks is by now quite familiar to New Zealanders.

As distinct from circular work, there are various linear systems used for bridge and general construction. One system wraps the wire continuously around the beam or slab and thus eliminates the use of end anchorages. This can be used for floor or wall slabs or decking and is known as the Preload Crom System, named after its inventor. *See photograph of roof panels for U.S. Navy warehouse.*

For large and continuous span bridges Preload uses the Leonhardt system whereby all the wires are concentrated in one cable for each girder, while at the end of the structure the wires are locked in big anchor blocks. *See photograph of Heilbronn railway bridge.* The stressing of the wires is done by jacking the blocks away from the actual bridge structure, which can be done because the wires are free to move inside the metal boxes, while the anchor blocks themselves can slide on special plates. Special provisions are made to reduce the friction on the wire cables.

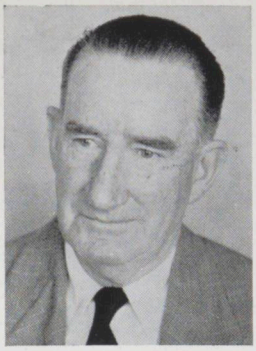
The Freyssinet system is also popular, although its use is mainly restricted to the specially-developed cone-anchorage, largely for linear construction.

In the Hoyer system no end anchorages are used and the wires are stressed before the concrete is poured. It is a pre-tension system.

Lee-McCall systems are extensively used in U.K., U.S.A., and Germany; Magnel-Blaton is popular in Belgium and to a lesser extent in Great Britain, while Freyssinet is the dominant system in France, but is also extensively used in other parts of the world, including New Zealand and Australia.

Pre-stressing of concrete will not change the whole face of the construction industry. There are many types of structures such as tanks and reservoirs for which it is cheaper and more efficient: on the other hand there are many jobs in which more conventional types of construction are less costly and quite as effective.

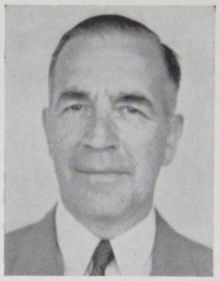
Pre-stress construction is often more economical: it is generally quicker than more orthodox methods; but, most important of all, it enables architects and engineers to design and build structures which formerly could not be attempted in normal reinforced concrete.



W. H. CARLYLE—Manager

The Acoustics and Insulating Division of The Fletcher Construction Company was set up in 1953, under the management of W. H. Carlyle, to give a much needed service. Since its establishment, the Division has supplied the acoustic material for hundreds of contracts, amongst which are the factories of Korma Mills, General Motors (Lower Hutt), Mosgiel Woollen Mills; several hospitals, including the Christchurch Public Hospital; banks, theatres, telephone exchanges, and broadcasting studios. The most recent contract was the "Limpet" sprayed-asbestos treatment of the Auckland City Council Chamber. The Division applies and sells every kind of acoustic and insulation material, and gives a free consulting service to architects on acoustical and insulating problems.

Robert Van Meeuwen, the author of this article, is the consulting engineer of the Acoustics and Insulation Division of The Fletcher Construction Company. Born in Holland, he graduated at Delft University with a Masters degree in Engineering and, since arrival here, he has become A.M.N.Z.I.E. From 1933-37 he was an engineer with the Texas Oil Company (Netherlands), and then went to Soerabaya in Indonesia for Lindeteves Ltd. He later went to Dutch Guiana where he designed a sawmill and a plywood mill. He joined the staff of Fletchers in 1953.



Consulting Engineer
R. VAN MEEUWEN

SOUND ADVICE

There are two broad groups of sound that can be controlled to make life more agreeable—those we like, and those we don't like. Among the first we include clear speech and music: the latter we just call noise. The science of acoustics deals with both and tries to improve the first and decrease the second. What can be done to improve speech or music under conditions within our control?

Most people like singing in the bathroom because the reflections of the sound from the tiles or enamelled walls amplify the volume and give a fullness of tone which we do not get in an ordinary room. Sound waves radiate from their source at the rate of 1,100 feet per second, gradually losing their energy as they travel through the air, or becoming absorbed by impact with surfaces in an enclosed space. In a large hall it is noticed that sound persists after the source has stopped. This is due to reflections from the walls known as reverberation, and the time between the emission of sound and its fading away into silence is called reverberation time.

From our bathroom experiment we realise that a certain amount of reverberation is desirable in a room to make speech clearly audible and to add richness and fullness to musical sounds. Beyond certain limits, however, reverberation causes confusion through excessive overlapping of sounds with others that have not yet died out. Speech becomes indistinct in these conditions.

Experts in acoustics the world over believe that good acoustics depend in 80% of cases on the correct reverberation time in the building and, after 25 years of research, simple figures and graphs are now available to help the designer to decide which is the optimum reverberation time for halls of different sizes and purposes. Naturally, the acoustical properties of a theatre should differ from those of a church or concert hall. Public halls are usually built for all purposes and the acoustics engineer has to find a happy medium which is not always ideal for every case but is fairly near the optimum for general use.

Whether the acoustics are brought in at the designing stage, or only after faults appear in an existing building, today's science and techniques are able to effect remarkable improvements. It is possible to measure the magnitude of the deficiency in sound absorption, and correction can then be made by providing the necessary absorption in a number of ways.

In an ordinary room or private office this is done (often unwittingly), by putting a carpet on the floor or hanging curtains, which "deaden" the sound. In public places, or

If the S.P.C.A. hears about this you'll be sorry you didn't buy acoustic panels in the first place.

Drawn for the RECORD by Alan Dunn

large offices, it is usually not practical to put carpets on the floor, but instead, we can put a carpet on the ceiling or higher portions of the wall. This sounds a bit absurd but when we apply, for instance, a coat of asbestos fibre of ½-in. or 1-in. thickness, we are actually putting a carpet on it, and a most effective one.

Another method is to replace lining materials, such as fibrous plaster, which is highly reflective to sound, by acoustic tiles or perforated plywood panels with a blanket of absorbing mineral wool behind the perforation. The area of acoustic panelling can be varied to obtain the required amount of sound absorption and, with sprayed asbestos, the same effect is achieved by varying the thickness of the application.

The standard of measurement usually taken is an open window, which is said to have an absorption of 100%,

We could put a carpet on the ceiling.

because all sound that goes through will never return. All materials reflect sound to a certain extent and tests have proved that most ordinary building materials have a very low absorption coefficient. To mention a few: concrete, hard plaster and brick, have an absorption of only 2% of an open window; plain timber for floors, 6%; fibrous plaster or varnished timber, 3%. Wood fibre-sheets, Pinex or Celotex have 30% absorption when not painted but, as soon as the surface is sealed by paint, the absorption drops to only 10%. Acoustic materials such as **Perfotiles** and perforated materials with **Insulwood** batts behind them, and **Sprayed Limpet Asbestos** have absorption coefficients up to 85%, varying with the thickness of the sound absorbent material and the frequency of the sound.

What about noises—the sounds we do not like? Noise has for a long time been considered a necessary and unavoidable nuisance that went hand in hand with industry and little effort has been made to prevent or control it. Of recent years, however, it has become recognised as a very real and potential danger to health and according to doctors or nerve specialists, who treat patients for nervous breakdowns or impaired hearing, the cause is often the delayed effect of noise in places of work. It has been proved by industrial experts that noise costs money expressed in low output, careless work and high labour turnover. There is also a legal aspect to be considered, where, for example, noise may, under certain circumstances, constitute a nuisance and may make a manufacturer liable for heavy damages.

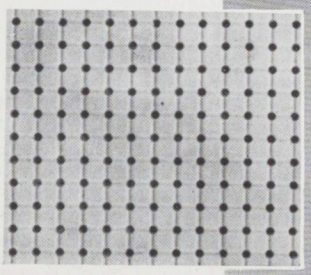
There is no simple or cheap way of eliminating noise but the improvements which can be made by acoustic engineers outweigh the cost of their services. There are four basic methods for reducing unwanted noise:—

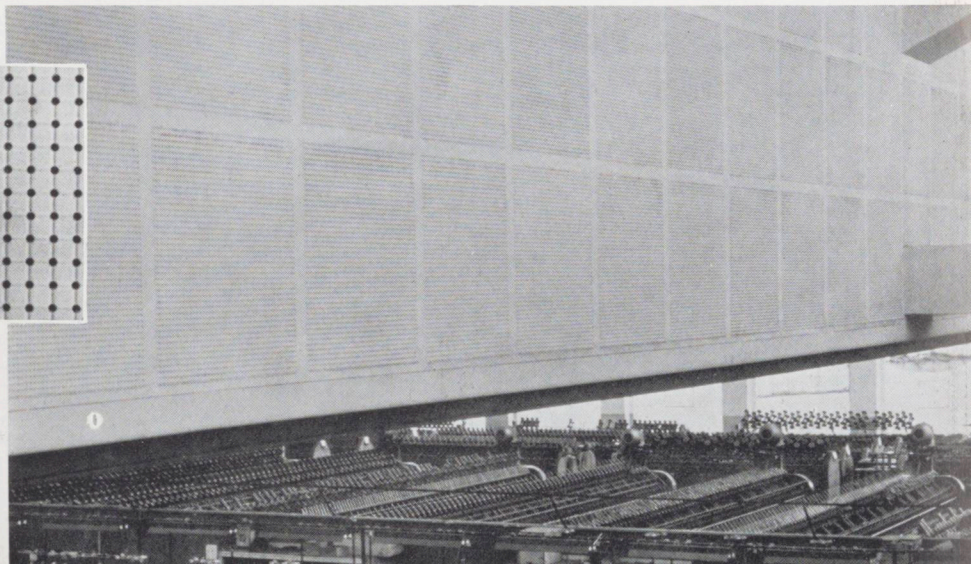
- Isolate vibrating machines by putting on damping mounts of rubber, cork, springs or other material.
- Provide insulation enclosures for noisy operations.
- Apply acoustical treatment to walls and ceilings.
- Institute careful maintenance of heavy machinery to eliminate noise of worn gears and loose parts.

The first should be considered in all cases where machines are being installed. The fourth is mainly dealt with by the maintenance engineer who realises that noise means, in most cases, unwanted and unnecessary wear. The other two methods should be taken into consideration in the design of new factories or offices and in existing premises where noise is present to such an extent that ill effects on personnel can result.

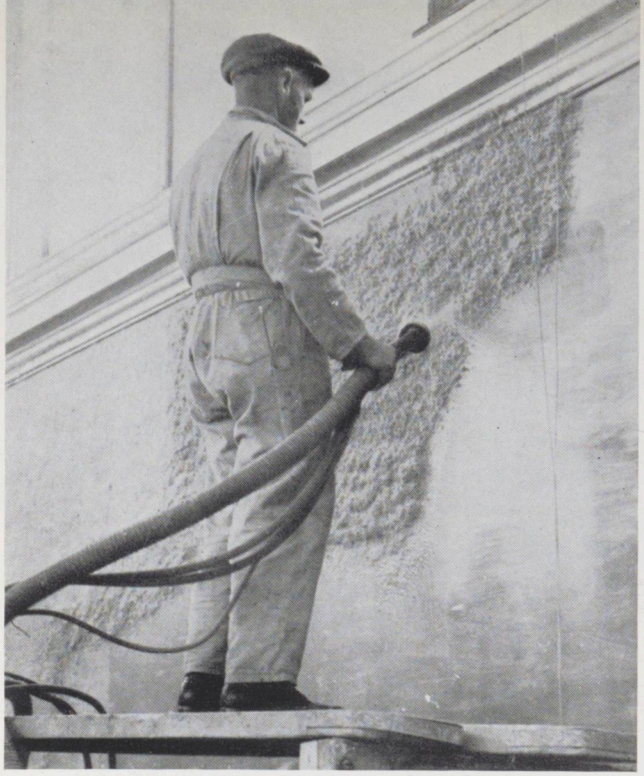
These methods of noise insulation deal mainly with internal noise which should be stopped as near as possible to the source. Noise suppression cannot be 100% effective and there may still be enough to cause a nuisance in adjacent rooms and buildings.

When a building is being planned, consideration should be given to external noise levels and the architect should design his outside walls, windows and partition walls with adequate noise insulation. The minimum noise is absolute





Perfotile acoustic treatment at Korma Mills, Auckland. Close-up shows section of a 2-ft. x 2-ft. Perfotile, over 20,000 of which were used on this contract.



Sprayed "Limpet" asbestos being applied at Law Courts, Oamaru.

silence; the maximum is vibration of such magnitude that we no longer hear it, but feel it as discomfort or even pain. Just as with the thermometer, this range is divided into a number of units, in this case 120 units called decibels (DB). In a quiet home the noise level is about 30 DB; in a good office it is about 40-50 DB; in a bad office 60-70 DB; in a noisy street 80-90 DB. Within 10 yards distance, an aeroplane motor creates a noise level between 110-120 DB.

The reaction of the human ear is, however, not accurate and when a sound decreases by 10 decibels, we get the impression that the noise has been halved. If it decreases by 20 DB, the apparent reduction is considerable and the noise seems only a quarter of what it was. The noise insulation value of walls is expressed as a resultant drop in noise level, or in other words, a transmission loss in the wall. When a noise source creates a noise level of 80 DB on one side of a wall and the measuring instrument on the other side of the wall shows only 30 DB, then we say that this wall has an insulation value or transmission loss of 50 DB. Most building materials and wall constructions have been tested in laboratories and, in every text book on acoustics, we can find the exact figures for the insulation of a certain type of wall.

Most people like singing in the bathroom.

A very annoying property of noise is that, like water, it always tries to find a leak. From an acoustical point of view, a keyhole in a door is almost as bad as a square-foot hole, and cracks in the plaster of a brick wall can reduce the insulation value considerably. It is wrong to assume that soft fibrous materials are good noise insulators, for they are so porous that the noise travels through them with comparative ease. Filling an air space of 2-in. between two brick walls with mineral wool increases the transmission loss by, perhaps, only 2 or 3 DB. If, however, the mineral wool is used between two sheets of plywood or other thin material, it increases the insulation value considerably because of the damping effect of the resonance vibrations of the sheeting, like a mute on a violin.

What can be done about external noise in existing buildings? In most cases a 50% noise level reduction can result from making the walls highly absorbent. If the room is very reverberant, old sound waves still play around in reflections when a new sound wave comes in, thus increasing the noise level. By making the room very absorbent, every sound wave that comes in is immediately killed. If the noise comes through the closed window (glass panes have only 20 DB insulation) a double glazed window will reduce the noise by 50%.

There is also a legal aspect of noise.

Public buildings in this country are mostly notorious for bad acoustics and the town halls in our main cities are some of the worst examples. These buildings were erected, however, in a time when the acoustics of a hall were still considered to be a question of luck and, in these cases, the architect just did not have his lucky day. An excellent example of good acoustics is the Royal Festival Hall in London. This concert hall had to be located in an extremely noisy area near an overhead railway bridge, and a very high external noise level had to be reduced to a level of 30 DB inside the hall. Science and technique went hand in hand and what was calculated in insulation value of the building materials was exactly achieved. The response of the hall to the orchestra is almost ideal, and the full quality of every instrument is clearly heard by the audience from stalls to gallery. Architects were guided in their design by acoustical experts who advised them on the shape and dimensions of the hall and the most suitable lining materials.

But acoustics have a proper part in our everyday life. Modern shops and offices as well as factories and public buildings are being designed with sound values as a main consideration. More and more people are beginning to realise that proper acoustic conditions are just as important for human comfort as ample light, sufficient ventilation and temperature control.

ON SYDNEY SIDE

where 24° of longitude gain 4 hours of latitude around closing time.

When we nailed up our first job sign in Sydney in 1950, we could say with some truth that we had arrived there via Samoa. From 1946 to 1949 we operated a construction unit in Apia, Western Samoa, where we designed the new Methodist church, and among other work built a store for Morris Hedstrom Limited, as well as several bridges. There, we operated under the name of Fletchers (South Seas) Limited and it was in fact around this entity that our Australian business was built. We were in business for a year under that name until, in 1951, a new Company—The Fletcher Construction Company Proprietary Limited, was formed. E. L. (Lyall) Young, then Manager of our Dunedin branch, took over the managership at Sydney, and Jim Espie who was Manager at Apia went over as his assistant.

Extension of our activities to Australia caused some comment at the time, but the reasons are easily understandable. In New Zealand the tempo of housing construction was expected to fall whereas in Australia, and New South Wales in particular, faced with the large intake of migrants, housing was top priority, and the authorities in New South Wales invited Fletchers to come in and help, on the basis of our known record of housing in New Zealand.

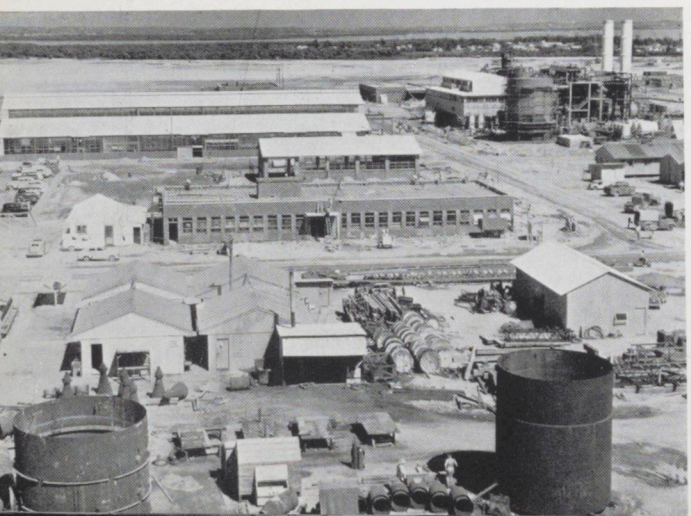
Our "pioneers" arrived in Sydney in July, 1950, and work was quickly begun on a group of cottages for the Housing Commission of New South Wales at Dee Why, a suburb of Sydney. Nearly one hundred brick veneer and timber-framed houses were erected at Dee Why, as well as twenty-four prefabricated Vandyke-type cottages and a block of brick shops. At the same time, down at Unanderra near Wollongong (on the coast south of Sydney and close to the big B.H.P. centre of Port Kembla), we also built another fifty cottages for the Housing Commission.

The original Sydney offices were in a room in the South British Insurance Building in O'Connell Street, in the heart of the city, but in January, 1952, we built an office, joinery factory and mill at Brookvale, but we have recently leased larger city offices in the Mercantile Mutual Building.

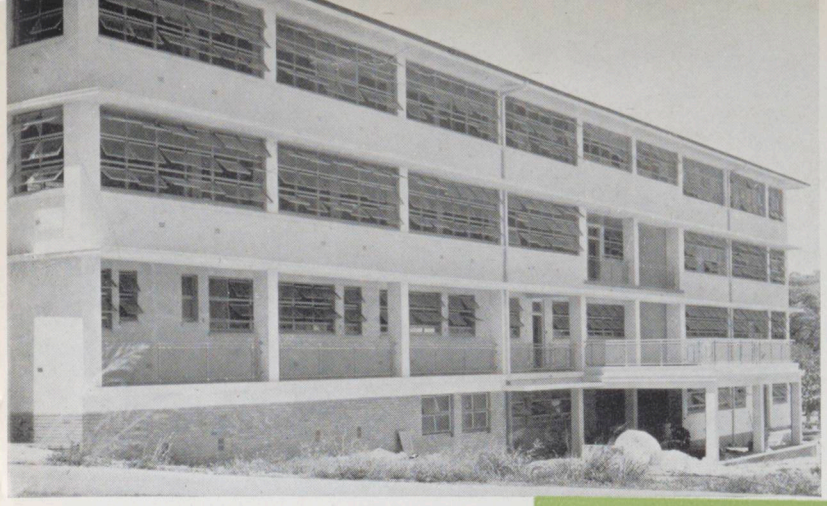
The economic recession in 1952-53 hit Australia hard and the Federal Government's decision to limit credit and loan funds for building affected all construction companies including our own. Many contracts were cancelled or suspended overnight and our Company was obliged to seek work further afield. In this period we undertook work at Walgett in the north-west of New South Wales where, among other jobs, we built a civic centre and a bank for Rural Bank of New South Wales. We ventured up to the subtropical North and built a thoracic and pathological hospital in Townsville for the Townsville Hospital Board. We subsequently added a new dispensary and made alterations to the casualty department.

In May, 1953, Lyall Young was recalled to New Zealand to take over a position as senior Fletcher representative on the pulp and paper mill site at Kawerau, and he was succeeded by Jim Espie who still occupies the position of Australian manager.

View from "cat cracker" tower, Kurnell, showing office and staff buildings, workshops, power house and laboratory.



Permanent workshops, Kurnell Oil Refinery



Townsville Hospital, North Queensland

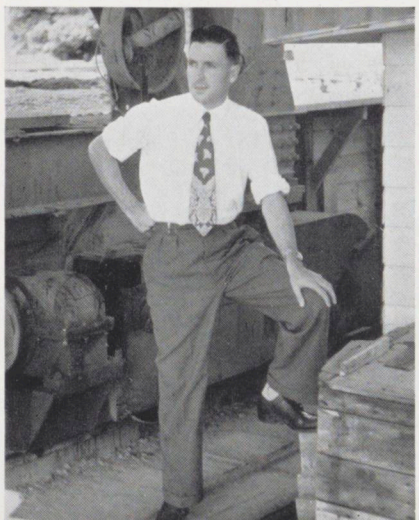
"Bluey" Whittleston (centre) and friends

Industrial development in Australia has been very rapid and of particular interest has been the construction of three large oil refineries, one in Western Australia at Kwinana, another at Geelong, and the third in New South Wales among the swamps and sandhills of Kurnell in Botany Bay, close alongside where Captain Cook first landed. The Kurnell refinery is being built for the Australian Oil Refining Limited (a Caltex company). Our Australian company designed and built a prefabricated timber building suitable for the temporary facilities required on the site — contractor's offices, change rooms, warehouses and canteen, and altogether some 56,000 square feet of these structures were fabricated and erected. More recently Fletchers have undertaken some of the permanent construction, and the workshops (222 feet by 87 feet), storehouse (163 feet by 107 feet), yard office, laboratory, garage, central tool room and small shops have all either been completed or are nearing completion.

Fletchers, of course, have had another direct connection with the oil refinery

(*Continued on Page* 15)

JIM ESPIE, Manager of Fletchers in Australia



DUNEDIN *Personalities*

★ A. J. (Jock) LENNOX came from Mitchell Bros. (Dunedin) in 1945 to join Fletcher Construction as supervisor. He is now Dunedin Branch Manager.

★ E. O. (Eric) KNEWSTUBB was Secretary of Stevenson & Cook Engineering Company Limited when it was acquired by Fletcher Holdings Limited and has been Branch Accountant at Dunedin since 1951.

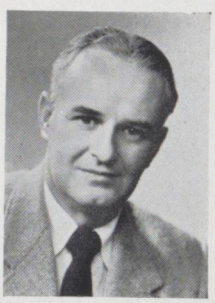
★ G. A. (George) BOURKE joined Fletcher Construction in Auckland as Quantity Surveyor in 1939, and after the war served his time as a carpenter. He was later Manager of the N.Z. Marble Company in Auckland and since May, 1954, has managed the branch in Invercargill.

★ W. (Bill) MEACLEM was with T. R. McLaughlin & Co. Ltd. as Manager when that Company was acquired by Fletcher Holdings and is now South Island Manager of the Plumbing Division of Fletcher Construction with his headquarters at Dunedin.

A. J. LENNOX

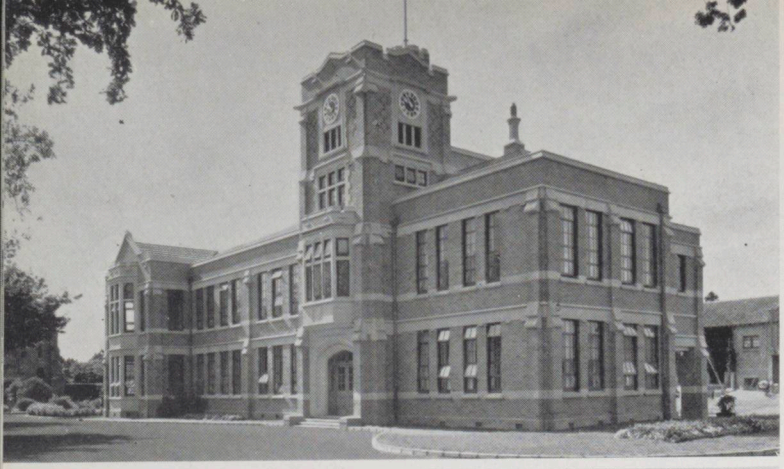
E. O. KNEWSTUBB

G. A. BOURKE



W. MEACLEM

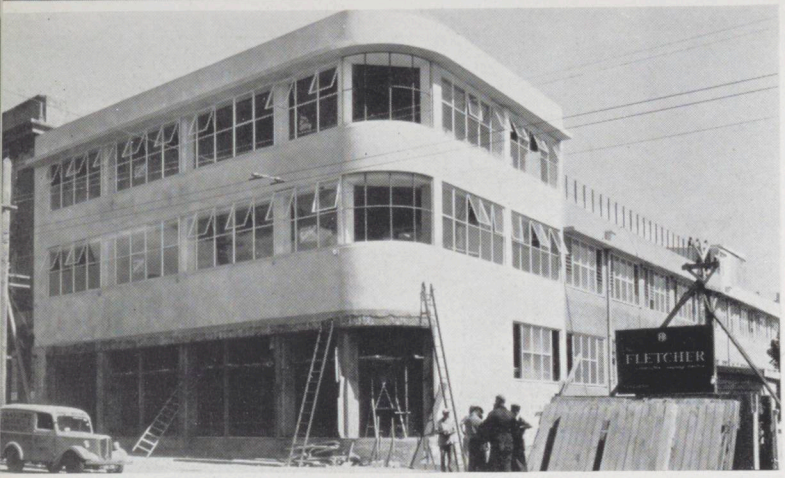
Going up in Auckland



KINGS COLLEGE LIBRARY—Middlemore

This stately war memorial is an example of the best work demanded of the building industry. The design is in keeping with the other college buildings including the well-known Memorial Chapel. It was recently opened by the Governor General.

The reinforced concrete frame was erected under foreman Bill Gladstone who retired during the course of construction. Tom Nicholson took over and saw the contract through to completion.

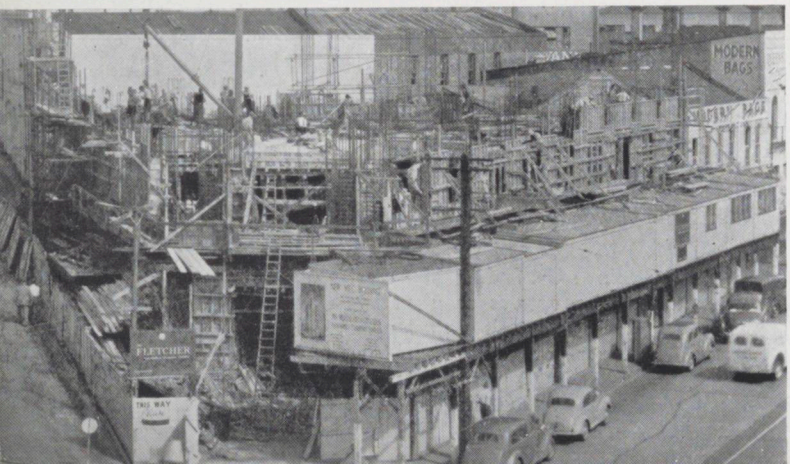


KIDD GARRETT LTD.—Hobson Street

A £100,000 reinforced-concrete machinery warehouse designed in our Engineers Office in Auckland. There is a built-in travelling gantry crane on the top floor for the handling of machinery, and included are a large showroom, a service department, first-class offices and staff amenities. Started in January, 1954, under Bert Brown, the contract was taken over by Charlie Clews. The crane and steel framework were erected by Fletcher Steel with Harry Miller as foreman. Bill Beck was in charge of reinforcing steel work.

RIDGE TYRE REMOULDING CO. LTD.

The new premises include 16,000 square feet of factory space and administration offices. Frank Campbell, foreman of the job, and his men were haunted throughout by seepage water and drainage problems. The site is cut into a solid papa cliff face at the back and overhangs what used to be the shore in the front. Foundation piers go down through buried wharf and jetty timber.



M.L.C. BUILDING — Queen Street

The £400,000 reinforced - concrete office building which will have nine office floors topped by a caretaker's flat and a tower. On a kite-shaped corner site with 55-ft. and 95-ft. sides, one of which fronts on to a steep side-street, the job is restricted for space and the concentration of labour has made special problems. The first three months of construction were taken up with the extensive under-pinning of two adjacent buildings. A further four months were spent on foundations and basement and ground floor slab. Concrete work should be completed to the maximum height of 135 feet by November. Bert Brown is foreman, and Alec Clarke is in charge of reinforcing steel erection.

SACRED HEART COLLEGE—Tamaki

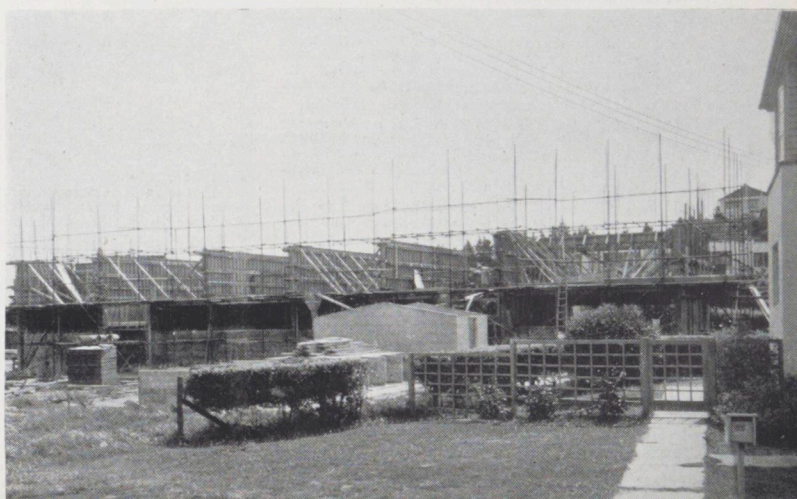
The panoramic view above, taken from the playing fields shows the group of brick and concrete buildings which have a combined frontage of 800 feet. The photograph at the right looks along a covered way towards another block in this £200,000 contract. The building was sufficiently far-advanced for occupation after 18 months and the official opening will take place early in June. For the first 12 months, Ted Dudson's carpenters and labourers were kept on their toes working to a very intricate concrete-frame design. Ted Wright was in charge of the reinforcing steel-erectors. Apart from the gymnasium, only finishing work remains to be done.

FISHER & PAYKEL LIMITED—Panmure

This new refrigerator and washing machine assembly plant covers 45,000 square feet and although it is now completed, the men are staying on the job to carry on with extensions which will be half as big as the finished premises. The building was designed by our Engineers Office in close consultation with the clients who contributed many ideas for incorporating the high standard of office and staff accommodation for which they have a reputation. Alan Bell, fresh from triumphs over the road on Alex Harvey's Fletcher-designed factories, has been in charge. The steel frame for the factory was fabricated and erected by Fletcher Steel, under Jack McKay's supervision, and Shorty Martin supervised steel reinforcing.

DEMONSTRATION FLATS—Western Springs

This contract consists of five blocks of three storeys and will accommodate 90 families in individual flats. The saving of land is self-evident as only 15 separate houses could have been built in the same area. Extensive use is being made of fair-face concrete, both inside and out, and, to achieve the desired smooth finish, shutters are of 8 x 4 resin-bonded ½-inch plywood. George McCulloch is foreman.



Buildings with FLETCHER signs are going up all over New Zealand and photographs of jobs in other places will appear in later issues.

Personalia

AUCKLAND

HATCHED: Daughters to Mr. and Mrs. L. E. Heron and Mr. and Mrs. Reg Newby (Drawing Office). Sons to Mr. and Mrs. Murray Futcher and Mr. and Mrs. Jim Austin (Vulcan).

MATCHED: Esme Brydone became Mrs. Donald Kelly on Easter Monday. Keith Williamson (Hamilton) married Dawn Rintaul on March 19.

ATTACHED: Yvonne Berghan has announced her engagement to Mr. Neil Vodanovich.
Congratulations to them all.

WELCOME: Fay Wallace was the sole "Miss" of our recent feminine intake of staff. The "Mrs" include Meta Christianson (Timber), Elizabeth Giles (Vulcan), Pam Pullar (Industrial Consulting Division), Pauline Waby (Office) and June Wilding (Sales & Services).

PLYWOOD LAMINATIONS: Warwick Mayer, the new technical adviser, has replaced Tom Wardell, who has gone into his own business. Tony Philson has joined the staff as industrial chemist in place of Jim Barnes who left in February. Jim Cansdale recently transferred from the Quantity Surveyor's office to the Work Study section. Bill Bell has been promoted to charge hand.

AMPLIFICATIONS: There is more noise and less space in Acoustics Division with the arrival of Mrs. Shirley Newman and Roy Farr.

SALES TALK: Brians are still in season at Sales Division. Two new representatives are Brian Downey and George Bryan.

SPARKS FROM VULCAN: The Works Picnic held at Orewa on February 27 was attended by 300, filling five buses and many cars. The children bathed, feasted on ice-cream and lollies and took part in the sports meeting. Parents, too, competed and the 100 yards works championship cup was won by J. Colquhoun and the tug-o-war went to the labourers' team.

WELLINGTON Wisdom

New office extensions are completed at last—one less furrow to be counted on the brow of "Old-Woman-in-Shoe" Arkley.

WELCOME: To Colin Brough (Accountant) who is a keen golfer (Jack Neale will have to look to his laurels); Fergus Dick (Timber Company); Jim Bishop, Doug Catley and Roy Hanns (Quantity Surveyors); Mrs. Lois Williams recently returned from the U.K.; Gladys Lambert (Teleprinters) from Scotland; Susan Ashford (Purchasing); Barbara Nichol, transferred from D.S.C. to Kaiwarra; and Cliff Smith (Industrial Relations). Don Bryce, who was farewelled from D.S.C. is now in Purchasing Division. Charles Ashford and Tony Scorange have joined the Steel Company at Cable Street before going to Gracefield.

CONGRATULATIONS: To Peter East on his recent marriage; Mr. and Mrs. Tom Fox on the birth of a daughter; Mr. and Mrs. Graham Trim on the birth of a son; Valma Woodgers and Marie Landers who have turned 21.

Jark Elvines (Office) plays the cornet in the Hutt Band but, at the recent Auckland championships, mosquitoes seemingly did not appreciate the cold blast from the Wellington tubas and attacked, winning the day for the home side.

Top brass of another kind turned out to farewell J. C. (Jack) Watt who left on March 18 after many years of service during which he was branch manager of both Steel and Construction companies at different times. J. J. Craig expressed the good wishes of directors and staff and presented him with handsome gifts from both.

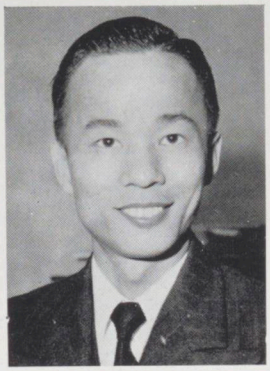


Photo by courtesy "Evening Post"

PETER YEW

Peter Yew, the young Chinese student from North Borneo, who was working under Jack McCoskrie at Head Office for some time while completing his studies under the Colombo Plan, came top out of the 623 candidates in the N.Z. Auditing Exams. Peter was very popular during his stay, and Auckland staff extend congratulations. He has returned to North Borneo with his wife and child.

DUNEDIN Diversions

(From Don Chisnall)

CONGRATULATIONS: Births have been announced to A. G. Partridge, R. R. Nesbit and W. S. Goodman. News comes from the Joinery Factory of the engagement of Duncan McFarlane to Beverley Vercoe.

WELCOME: To Misses I. K. Kraus, N. Christie and S. Archibald.

PLUMBING DIVISION PICNIC: Staff, wives and children held their annual picnic on March 13. There was fun and food galore for the kids and races for all. W. Galland won the men's 100 yards and the ladies' title went to Mrs. Bain. Cricket sides of 20-30 became so engrossed in putting each other out that the score was lost. Genial Bill Meaclem proved himself the perfect host, and much of the success of the picnic was due to his efforts and those of his committee.

KAWERAU Correspondence

(From Rex Moyle)

At Kawerau we have a small but active band of Air Force types whose social occasions are known for their standard of entertainment—hence invitations are prized. Latest, was a first-rate barbecue with coloured lights, marquees and a summer-house bar. Chief cook was Charlie Goddard who shared honours at carving the succulent porker with Project Director, Walter Hammer.

...The opening of the local branch of the Bank of New Zealand gave pretext for another party. The boys were complimented on a fine job of building and with no further ado the bar was opened.

There have been three welcome newcomers—Margaret Greasley, Natalie Box and Ross Mathieson (ex Wellington).

SPORT

WELLINGTON CRICKET: Congratulations to the Fletcher Holdings XI, winners of the Mercantile League G Grade competition. They lost only one game and recently scored an outright win by putting their opponents in and out twice and making 164 runs without losing a wicket. Captain is Tom Fox of Fletcher Steel. Next season they will be playing in a higher grade.

March 12 was the cricketers' big night—the annual prize-giving smoke concert. The Farrell Cup for the best batsman went to Bill Preston, and Bob Stringer, the youngest member, got the Anderson Cup for the most improved player.

Games have been played against other Fletcher teams. Christchurch was invited to Wellington on April 2, but a Sunday match against Palmerston North had to be cancelled owing to the Hutt River flood, arranged (so say Wellington) by the visiting team. Wellington categorically denies having refused challenges from any other Fletcher branch.

CHRISTCHURCH: INDOOR BOWLS began on March 14. The club has the largest membership in Christchurch and looks like being larger still.

THE CRICKET TEAM maintained an unbeaten record and scored a victory over Wellington branch with 191 runs to 155.

DUNEDIN CRICKET: A successful season ended with a good win over Pirates. Highest scorer was Arthur Allpress with 36. Ray Tippet took 4 wickets for 18 runs. Arthur is a newcomer to the staff and a welcome addition to the team.

AUCKLAND CRICKET: A late but enthusiastic start brought disaster in the first game against Nathans. In the first innings all were out for 28 (Judy Browne 10, George Fraser 6 n.o.). Next innings they got 135 (Doug Laughton 44, Judy Browne 21) but Nathans won by 4 wickets. Judy was the only lady member of the team and made the game worth watching.

So-called "friendly" matches have been played every Sunday at Hobson Park since then but, judging by the limps and bruises on Monday, the term is a misnomer. Next season they may take up the game more seriously in the Business House League.

TENNIS: The Pascoe Cup team was downed 2-1 by the Army Dept. A mixed group of 30 turned out for a tennis evening on February 10. In a few rallies the ball did cross the net more than twice. But it was good fun.

TIMBER TEST: Okoroire was recently invaded by the Penrose Pinehearts and the Rotorua Rimustumps for a two-day cricket match. The popularity of this rustic last resort was evidenced by the presence of Waikato flies, gathered there for their annual Eisteddfod, and by signs that a fair percentage of the county's sheep had been through the week before.

In the first (and only official) innings, Rotorua collected a painful 81 with Bill Rowe contributing 0 (second chance 32), Hori Anaru 12, Hugh Fraser 9 and Jack Bourke 8. C. (caught and bowled) McLeary was an inspiration on the field. Pinehearts took it easy after passing 81 and were out for 93. (Des Sutcliffe 46 retired tired, Peter Brookfield 12, Bill Coxhead 11 and Udie Harper 10). The others contributed mainly to the fun.

Auckland's victory warranted celebrating and it was a very different eleven on Sunday morning which made 98, starring Bill Coxhead 39 (retired) and minor billings going to Roy Clapham with 10 and Ted Malatios and John Batchelor 7 each. Auckland were in no condition to stop Rimustumps getting 112 for 11, declared (Bill Rowe a fair dinkum 44, Jack Smith 19, Hori Anaru 20 and Jack Bourke 1, eventually). So they won the innings and the match.

JUDY BROWNE

SCOPE

From time to time Fletcher Construction has vacancies for junior and senior foremen. We are most anxious to promote men from the ranks but sometimes a decision has to be made very quickly and it is not possible to call for applications from all the staff.

If you feel you have the qualifications or that with a course of training in foremanship, you could make the grade, please write in and give us the details of your experience and age; also let us know whether you would be prepared to travel or transfer to another branch.

It is our intention to set up a panel of names of those who are seeking promotion in the field and, if the demand warrants it, we would be willing to start foremanship classes in the main centres. All applications will be handled in strict confidence and should be addressed to "Scope," C/o Editor of "Arrowhead," Fletcher Holdings Limited, Private Bag, Auckland.

CHRISTCHURCH News

(From Toby Buttery)

SOCIAL ACTIVITIES: The Social Club has elected its Committee for the year and two successful dances have been held already.

NINE BABIES—EIGHT FATHERS: Congratulations. Sons to B. S. Philpott and P. Holiday (Durock); M. J. Lester and H. J. Barton (Construction); C. J. Ross (Plywood) and E. Cusiel. A daughter to P. J. Daly (Joinery). Twin girls to Raymond Hopgood (Plywood).

Slings & arrows

MONKEY BUSINESS

The Sales Division in Auckland are displaying Durock and Duroid products at the Easter Show and have hired a monkey band to popularise their stand.

There's a seven-man band on the Durock stand,
With a one-string fiddle and a second-hand grand.
You will jitterbug like Ghandi with a monkey gland
When the monkeys play the theme-song on the Durock band.
Hear the Plywood Players and the Big Seven Slayers and the Weldtex Wendeleans,
And the Stick-em-to-the-Stringers and the polished Marble Swingers and the Hydroseal Orpheans.

They play the mambo jambo — sing asbestos serenades ("Your Hair is Wavy as a Siding").
Girls are swooning in the aisles as the boys hand out the smiles—
"Roll out the Roofing"—"No More on the Tiles"
"I'm getting cementimental over you."

YES, WE HAVE NO BANANAS: A sales manager with a sense of humour is still dining out on a story about a letter he wrote to a certain plywood factory asking could they supply 9/10th inch rimu exterior ply. The following helpful reply was received:—

"Sorry we cannot supply 9/10th inch as no rimu exterior ply produced. Have available three crates of 8 x 3 in 5/10th inch No. 2 matai interior. Is this acceptable?"

Colin Beaton (Quantity Surveyor) returning to England after a 20-month sojourn with us left us with this parting shot:—

"One has found the scenery extraordinary, the weather great, the hotel service average, the licensing laws puerile, the Maoris essentially New Zealand, public transport services inadequate, the school education standard high. Drivers' signals are sloppy (including one's own), the girls the same as at Home; skiing first class; fishing grounds unbeatable; it does not pay to be single; a car is absolutely necessary (to lead a normal life). Building and housing costs are completely out of proportion to the rest of the country's economy. Night life is non-existent; the commercials are the funniest items on the radio; politics too petty; for the country to prosper there must be an increase in the wages of the skilled; underwater fishing is the coming sport; athletics' standard high; long-distance car driving seldom dull; traffic officers annoying; airways efficient; the latitude allowed radio announcers amazing; a smoker's paradise. Rotorua is a gem. What a good thing for Britain that Abel Tasman had a cold reception!"

ON SYDNEY SIDE

(continued from page 11).

project in that the partnership, Fletcher-Merritt-Raymond, is building the 3,720 foot-long reinforced concrete pier where tankers will discharge their cargoes of crude oil for the refinery. This contract was awarded to Fletcher-Merritt-Raymond toward the close of the Auckland import wharf contract when it was clear that the modern marine construction equipment used in Auckland was available for work in Australia.

Fletcher - Merritt - Raymond more recently has secured another contract from the oil company to lay a sub-aquaceous (underwater) pipeline three miles long across Botany Bay from Kurnell to Banksmeadow for feeding the refined products to the outskirts of Sydney.

Fletcher Construction is at present busy with administration and staff buildings in Cooma, New South Wales, for the Kaiser-Walsh-Perini-Raymond joint venture. This group were the successful tenderers for the Snowy Mountains Hydro-Electric Authority for the construction of an arched concrete dam and a fourteen-mile-long tunnel forming part of the vast irrigation and hydro-electric works in the Snowy Mountains. Although our own company, with some reluctance, had to decline an offer to join this partnership, as an independent organisation, we are building the administration block, staff barracks and ten 3-bedroom cottages for the contractors.

"New" Australians with Fletchers in Sydney are Jim Espie, formerly quantity surveyor in Auckland, Peter Barton and "Bluey" Whittleston, late of the construction company in Dunedin, and Denis Danaher of Fletcher Steel in Wellington.

Recently it was decided to strengthen the Board by the appointment of directors resident in Australia. The new Chairman is Mr. Norman Frazer who is very well known in Sydney business circles and who has been closely associated with the Cockatoo Dockyards, the Mercantile Mutual Insurance Company Limited, the Davis Gelatine Company and many other industrial and pastoral activities.

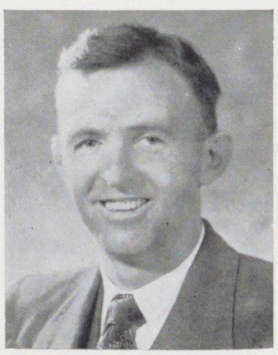
Other members of the Board resident in Australia are Mr. S. H. Bull, a partner in Smith Johnson and Company, one of the leading firms of public accountants in that city, and Mr. J. Espie, our own Manager.

With the big industrial development which is going on in Australia, and the full support of our New Zealand organisation, our Australian company looks forward with confidence to a period of expansion and prosperity.

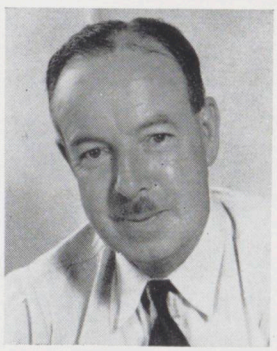
COVER DESIGN: We asked our artist to illustrate the theme of noise to introduce our article on work of the Acoustics Division of Fletcher Construction. The arrowhead of sound-absorbent panelling symbolises the restoration of calm and quiet—one of the main functions of acoustics engineering.

CARRIED FORWARD . . .

These two popular figures in FLETCHER STEEL were not overlooked in the March issue. The omission helps to enhance this issue with their presence.



W. J. (Bill) REIDY
Wellington Sales Manager



R. S. (Bob) HAUGH
Vulcan Office Manager

THE ESSENCE OF THE CONTRACT

Somewhere between the old sayings, "Time is money" and "The race is not always to the swift", rests a truth about the construction business.

Rushed work can be shoddy work, but slow work, no matter how meticulously carried out, is often costly, not only in itself, but in terms of delays in occupying premises and getting valuable machinery into production.

The point we wanted to make in this brief announcement is that just as the cheapest prices are not always the best prices, so the lowest tender is not always the cheapest.

A tender's worth is not shown by price alone. What is behind it in reputation, in experience and skill, in plant capacity? Pre-planning; method study; targeting; the right use of heavy plant and small tools; all these have fundamental parts in an approach to construction problems today.

Fletchers' Industrial Consulting Division is willing to be called in without obligation before the birth of a job, when it is still just an idea, but when experience and advice can best effect the greatest savings in time and money. The lesson of Kawerau is pre-planning after careful economic, technical, and engineering investigations, and a similar service is available from Fletchers.

Engineers and executives responsible for new construction are invited to call or write to our Industrial Consulting Division and discuss all or any of that wide range of problems that confront those wishing to build today, this year, or even in 1960.

THE FLETCHER CONSTRUCTION COMPANY LIMITED
INDUSTRIAL CONSULTING DIVISION
Great South Road,
Auckland
New Zealand

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