



lead

LEAD INDUSTRIES ASSOCIATION

292 MADISON AVENUE, NEW YORK 17, N.Y.

Architect's rendition of new Brooklyn Union Gas Company office building. (Courtesy of Francisco & Jacobus, Engineer & Architect.)



LEAD SANDWICHES TRANQUILIZE "NERVOUS"

Wherever new buildings are apt to get the "jitters" from subways, railroads or heavy traffic, you are likely to find lead-asbestos anti-vibration pads in their foundation. Nesting between the footing and supports of the building, these sandwiches of lead, asbestos, and steel cushion buildings from shock that might otherwise annoy the occupants.

A recent example is the Brooklyn

Union Gas Company's modern 14-story office building in Brooklyn, designed by Francisco & Jacobus, Engineer & Architect. With its polished granite facade and stainless steel mullions and window frames, this outstanding example of contemporary architecture fronts on Montague Street, a heavily traveled thoroughfare, under which a subway tube is located. To assure that vibrations would not be transmitted to the new building, Francisco & Jacobus recommended use of lead anti-vibration pads under all 66 supporting columns of The Brooklyn Union Gas Company building.

The sectional drawing shows nearness of the subway tube to columns along the front of the building. The average load on each pad under the building is 800 psi. The Engineer & Architect ordered pads from Ray Proof Corporation, Stamford, Connecticut, to the following specifications:

"Vibration pads to consist of a center core of #12 gage steel, with a $\frac{3}{8}$ " thickness of asbestos on either side. A $\frac{1}{8}$ " layer of chemically pure lead shall surround this assembly. Before the seams are sealed (burned), this assembly of two layers of lead, two layers of asbestos and one layer of steel shall be com-

pressed under 200 pounds/square inch pressure, after which all the seams are sealed (burned)."

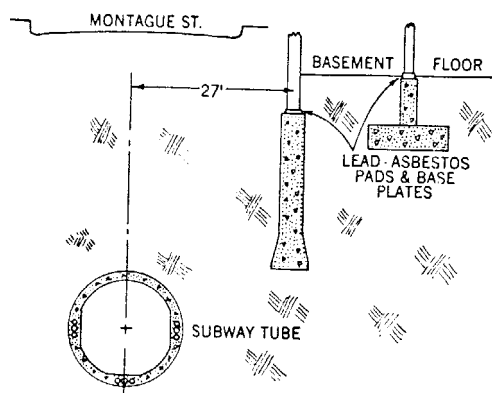
Often the lead pads rest freely on the concrete footing, weight of the column being sufficient to keep them in place. In this particular application the pads under The Brooklyn Union Gas building were pierced by anchor bolts mounted in the foundation. The columns were then bolted down upon the pads until enough steel was erected to hold them in place. Then the nuts were removed to prevent vibrations from entering the columns through the bolts.

In a typical isolated footing site, the following sequence of materials appears: a reinforced concrete base which varies in size to suit the column, two inches of grout, a $\frac{1}{2}$ " inch leveling plate, a lead anti-vibration pad nominally one inch thick, and finally, a steel base plate, to which the column is attached.

Construction of The Brooklyn Union Gas building was a joint venture; Wm. L. Crow Construction Company and W. J. Barney were general contractors. Thomas Crimmins Construction was the foundation sub-contractor.

Lead-asbestos pads are highly resistant to corrosion, with oil and

Drawing shows proximity of subway tube to footing of new Brooklyn Union Gas Company building.



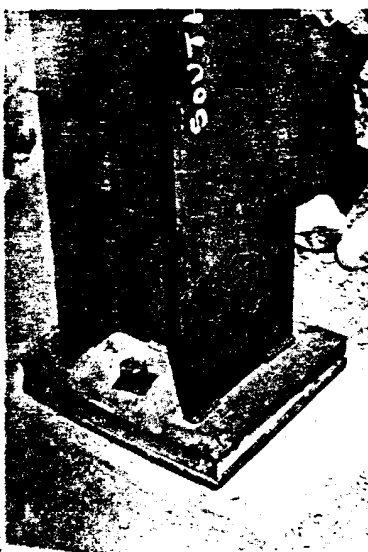
no maintenance yet

Lead-sheathed Spire Starts on Third Decade

YOU BUILDINGS!

...ind... have having little effect upon them.
...ore... Lead, however, is susceptible to attack
...by the lime present in "green" con-
...crete, and the pads should be protected
...freely... with asphaltum before they are used.
...of... Time and use have clearly demon-
...p... strated the effectiveness of lead-asbes-
...ap... the pads for vibration isolation, and
...lyn... The Brooklyn Union Gas building
...by... joins an imposing list of buildings that
...ation... use lead pads for this purpose.

Photo of footing with lead pad in place.



LIA26238

Eglise du St. Esprit, a church in Quebec which echoes the tradition of Old World France, has a spire rising gracefully above any in this quaint city. And, as true to its ancient French tradition as it is compatible with the most modern building techniques of today and tomorrow, this spire is sheathed in lead.

Lead was chosen for this church not only for its centuries old association with church architecture, but because of its color compatibility with the stonework of the church. As the architect, Adrien Dufresne, says, "the whole church looks like silver and the weather has not changed its appearance since the day it was built. Lead was chosen because it is closer to the color of the stone."

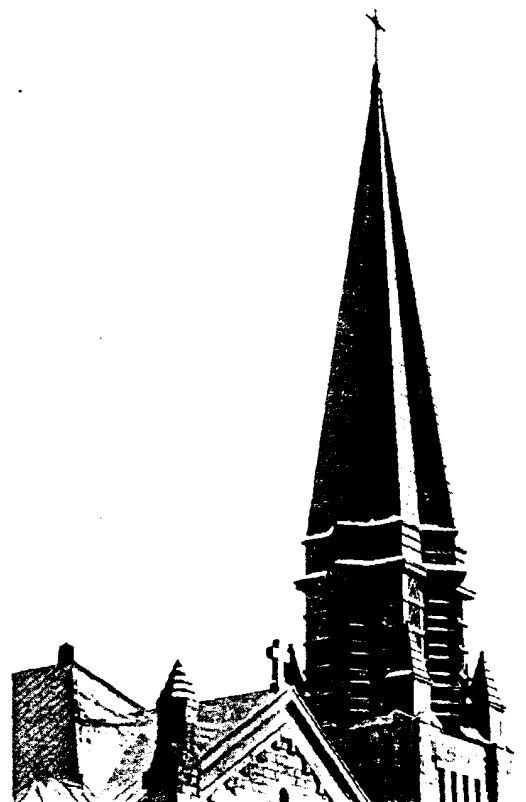
He has called attention here to a fine point in design — the harmony in color possible between two dissimilar materials — brought about, in this case, by the blending of lead and stone. Consistency, in this respect, was aided no little by the use of lead coated copper in the open work louvered section of the tower just below the spire.

The spire itself, an unusual eight pointed star in plan, rising a total of 198'-0" above the sidewalk, was finished with 4 lb. lead in 12" x 18" sheets.

Work was completed in 1941 by contractor Eugene Premont and M. Dufresne reports that in the intervening twenty years, through Quebec's

rigorous winters and contrasting summers, no maintenance whatsoever has been required. An impressive testimonial to the skill of the architect, the workmanship of the contractor and the ability of the material, with proper handling, to answer the requirements of any job properly assigned to it.

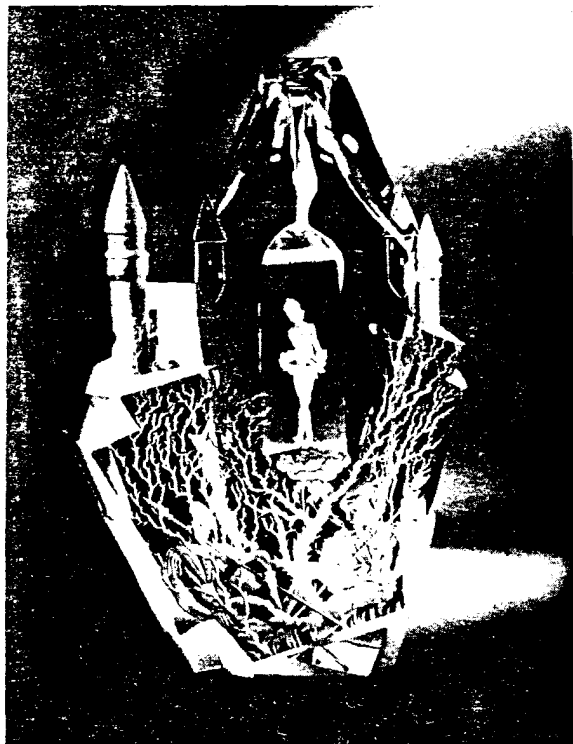
Twenty stormy Quebec winters have passed since this steeple was built.





President Eisenhower's "Nautilus" commemorates the passage of that submarine under the North Pole.

The King and Queen of Denmark were presented with "Sleeping Beauty," suggested perhaps by the story of famous Dane Hans Christian Andersen.



SCULPTURE

Fit for a King

There is nothing quite like Steuben glass. Admired the world over for its exquisite workmanship, design, and brilliance it is one of the few distinctively American art forms. It is literally fit for a king and has frequently been chosen as the most suitable gift for such rulers.

Pictured here are four of the pieces recently displayed in an exhibition of Steuben crystal in private collections.

The inherent brilliance of the crystal used by the Steuben craftsmen comes from flawless clarity and the high index of refraction provided by lead glasses in the melt.

"Cathedral," a fitting French theme, was presented to Charles de Gaulle during Eisenhower's 1959 visit.



"Saying of Confucius" presented to Chiang Kai-shek on his seventieth birthday in 1956.

energy/volume ratio

exotic energy source

initial cost

useful life

energy density

How do you choose a battery?*

energy/weight ratio

watt-hours per pound

cost per cycle

"In the last 20 years, there has been a rapid growth in portable electric energy sources. At the same time, there has been a rapidly growing demand for portable power units, or batteries, for specialized uses. In this myriad of new uses, the criteria by which batteries formerly were evaluated have been pretty well upset. In most cases, a single characteristic is of primary importance to the successful application of the battery . . . for example, perhaps in a specialty application, the energy-weight ratio may be all important; in another, it may be cycle life, or shelf life, or energy-volume ratio, or cost."

This quotation* puts its finger on the dilemma of many a designer and purchasing agent faced with the problem of selecting the best battery system for a given task. At the same time it shows why such a multitude of specialized batteries have come into existence — and why they continue to exist!

Surprisingly, though, nearly all of the "new" battery systems are not new at all. In 1839, for example, the fuel cell was known as the gas cell. And by 1842 a battery of 50 such cells was in operation. The nickel-cadmium and nickel-iron cells were patented at the beginning of the century. The mercury cell was proposed in 1866; the use of silver oxide was proposed in 1899 and patented 11 years later. Seebeck did his thermoelectric work around 1821.

Lead-acid batteries, too, have a long pedigree. In 1859, Gaston Plante' wrote, "The secondary electromotive force obtained with lead plates in water, acidulated with sulfuric acid, was greater and persisted longer than that of other combinations." As Grimes and Herbert go on to point out, "A hundred years of battery development work, on which has been built a giant industry, has failed to upset that statement. We believe that for many years to come, the lead-acid battery will continue to maintain its

position in the storage battery field as the preferred auxiliary power source for automotive use."

The high cell voltage Plante' noted is largely responsible for the excellent rating the lead-acid battery achieves in comparison to other cells. It offsets the higher density of lead and gives, for example, a better energy-weight ratio than other work horse batteries like nickel-cadmium and nickel-iron. Silver-zinc and silver-cadmium systems do even better in energy-weight ratio — but with a high cost penalty.

Considering ease of recharge, life, and costs, authors Grimes and Herbert conclude: "The industrial lead-acid battery is better than the other systems on the basis of cost per unit energy output over the life of the battery. Automotive lead-acid batteries have a lower initial cost than any of the other systems, but because of its better cycle life, the industrial type is more economical."

Comparison of common battery systems rated at 100 amp-hr, 12 volts

Type	Average volts/cell	Number of cells (12v)	Watt-hours		Charging Time	Est. life	Estimated Cost		
			per lb.	per in. ³			\$	\$/yr.	\$/cycle
Lead-acid									
Industrial	1.9	6	13.1	1.35	{ 5-10 hr @ constant potential or stepped current }	1600 cycles	70	9	.043
automotive	1.9	6	15.0	1.3		5-10 years 300 cycles 3 years	40	13	.13
Nickel-cadmium									
pocket	1.2	10	11.0	0.6	7-8 hr @ constant potential	2000 cycles 10-20 years	150	6	.075
sintered	1.2	10	11.5	0.88	2 hr if vented, 10 sealed	3000 cycles 10-20 years	300	20	.10
Nickel-iron (tube type)	1.2	10	10.6	0.92	6-7 hr @ constant potential	2000 cycles 15-20 years	130	7.5	.065
Silver-zinc	1.55	8	85-100	3.0	4-20 hr @ constant potential	200 cycles 1 year	800	800	4.00
Silver-cadmium	1.06	11	50-75	2.5	4-20 hr @ constant potential	500 cycles 2-3 years	1000	400	2.00
O ₂ -H ₂ fuel cell	0.7	16	not applicable or available						

*From "The Choice of Battery Systems," by C. G. Grimes and V. S. Herbert. This paper was presented at a recent SAE meeting. Single copies are available from I. E. A.



Mr. Fromuth at work in his Staten Island shop.

Three feet in diameter, the lilypad birdbath employs 8 pound antimonial lead for strength. A fountain is concealed in the center of the lily (right). The leaves are 8 pound and the blossom 4 pound lead.

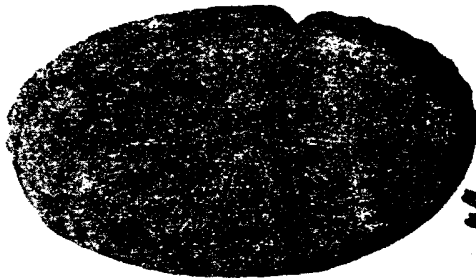
Craftsmanship in Lead

Sheet lead, long the choice of craftsmen as a medium for decorative and enduring artifacts, is regaining popularity in lawn and lobby decorations, fountains and planters. Samples of such work, pictured here, have been used in Manhattan penthouses, fine residences, formal gardens and several of the newer public buildings in the New York area.

Craftsman Barry Fromuth of Staten

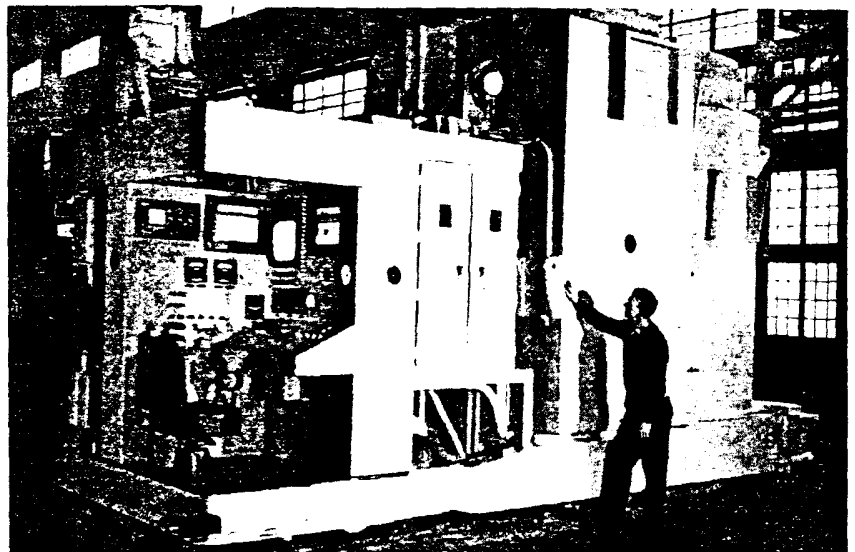
Island prefers to use 4, 6, or 8 pound lead (depending on the size of the object) for most of these. Long leaves and other members requiring high strength are made of 8 pound antimonial lead.

One of his favorite pieces is the lilypad pictured. Three feet in diameter, it serves as a drain fixture cover — and as an attractive bird bath at the same time.



200 TON CAR

Built at a cost of \$700,000 this "transfer cask car" will handle fuel transfer operation at the new Enrico Fermi Atomic Power Reactor. Massive lead shields protect the operator while the car carries "hot" elements from the pile to a lead decay chamber. Builder Baldwin-Lima-Hamilton incorporated a heat exchange system, too, for preheating new elements before insertion in the pile and to cool spent elements.





Sikorsky Keeps It Quiet

Anti-sub patrol at work — the acoustically treated cabin helps Sonar experts hear.

No helicopter flying today comes anywhere near the Rolls-Royce claim that the loudest noise in the speeding vehicle is the tick of the dashboard clock. But the Navy's HSS-2 anti-sub helicopter built by Sikorsky and reviewed in a recent issue of LEAD (lead-teflon bearings) has achieved a relatively quiet cabin through the use of a leaded vinyl-coated fabric septum, called Coustifab.

Civilian helicopters made by Sikorsky and now going into commercial airways service will benefit from the same treatment.

Finely divided metallic lead in the relatively soft vinyl sheet adds mass to the inherent "limpness" of the sound barrier. Acoustical experts have long known that "limp" mass of this sort is an excellent way of blocking sound transmission.

The leaded-vinyl and fabric septum is used in conjunction with glass fiber. These two materials complement each other: glass fiber reduces sound reflection. Coustifab reduces sound transmission.

Tests of the big helicopters insulated in this way show that cabin noise is reduced about 4 decibels in the frequency range from 20 to 75 cycles per second, 25 decibels in the 4800 to



9600 cycle range. In general terms, this means your ears would find the deep droning sound of the aircraft cut almost in half, the hissing and whistling noises dropped to one eighth their former value. Other frequencies are correspondingly reduced too, of course.

To achieve this quieting Sikorsky engineers employed two weights of leaded vinyl laminate. One weighs 0.48 lb/sq. ft. (0.030 in. thick), the other 0.88 lb/sq. ft. (0.055 in. thick). The civilian counterpart of the HSS-2 uses 20 yards of the lighter fabric and 7 yards of the heavier material. Another helicopter slated for civil air service, the S-62, uses about 8 yards of 70-ounce laminate and 4 yards of heavier material. Even the HSS-2,

which uses only about two yards has achieved a dramatic improvement.

In all three of these aircraft, the Coustifab has been applied to the roof area between the interior cabin facing and the structure. According to Sikorsky acoustics engineers it is one of the best materials they have tested.

Essentially, Coustifab is a composite of a layer of soft vinyl containing a large proportion of finely divided lead, and a layer of cloth backing. Where it is to be used to face a surface, self-adhesive backing is added. The finish face of the Coustifab can be tinted vinyl, either smooth or embossed, or a decorative fabric can be laminated to it. It is manufactured by Cordo Chemical Co. of Norwalk, Conn.

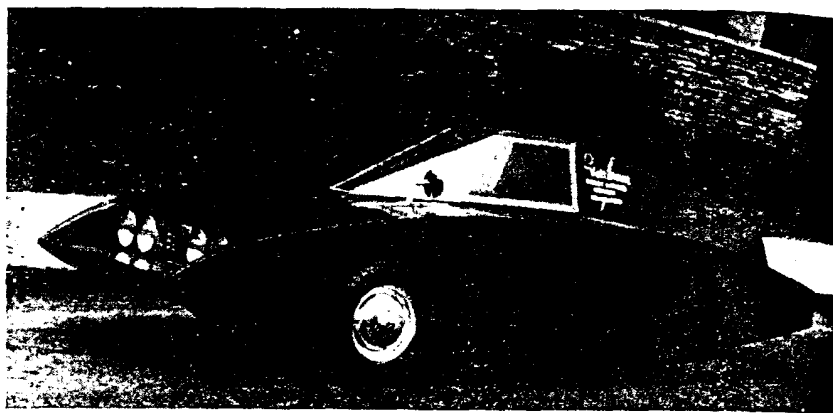


LIA26242

Civilian helicopters profit, too. This one uses 27 yards of leaded vinyl septum to quiet its 25-28 passenger cabin.

Electric Speedster

The "Voltaram" (pictured) is a one-of-kind lead-acid battery powered experimental car. Its manufacturer, Stuart Motors, Inc., of Kalamazoo, does not expect to put this car into production but is using it to test out components for a 4-passenger electric which will appear this fall. Advanced equipment and lightweight construction promise outstanding performance for the newcomer. Anticipated price tag: \$1500 to \$1600.



lead



LIBRARY OF TECHNICAL INFORMATION

The following publications are available free of charge unless otherwise noted. Send request to the
LEAD INDUSTRIES ASSOCIATION, 292 MADISON AVENUE, NEW YORK 17, N. Y.

The materials you buy — lead

Descriptive information about lead from mine to finished products. Reprinted from "New York Purchasing Review," January, 1959.

Corrosion Data — lead & alloys

Chart form presentation of the corrosion resistance of lead and its alloys to 188 common chemical materials over the normal temperature range. Reprinted from "Chemical Engineering," February, 1953.

Methods of lead lining tanks

Four page review of corrosion performance and fabrication methods for lead in process vessels and piping. Considers five ways of using lead. Reprinted from "Chemical Engineering," January 9, 1961.

Materials of construction reviews

Lead and lead alloys in design and construction for research and engineering use. Bibliographies for 1961, 1959, 1958 and 1957 are available (editions are not cumulative). Reprinted from "Industrial and Engineering Chemistry."

Lead-asbestos anti-vibration pads

Gives specification, drawings, and reviews recent applications of lead-asbestos anti-vibration pads for buildings.

Lead work for modern plumbing

\$2.00 Postpaid, \$1.50 per copy in quantities of 10 or more.

Profusely illustrated with over 140 photographs and drawings, the textbook presents clearly to the plumbing student the necessary tools, procedures and the methods required for lead work.

Red lead technical letters

No. 12 Seven formulations and schedules for painting highway structural steel.

No. 13 L.I.A. Formula 9-2. A single Red Lead Primer for Rusted, Weathered or New Galvanized Steel.

No. 14 Describes the formulation of red lead-coumarone primer for seawater immersion — ship hulls, fixed marine installations.

Lead in modern industry

(Request on company letterhead, please)

A fully illustrated 230 page, cloth bound book describing all phases of the production and use of lead, lead alloys and lead compounds.

Truck costs in a jiffy

Three nomographs permit estimation of costs for gas or battery powered industrial trucks in two or three minutes. Depreciation, operating costs, and maintenance are appraised separately for all unusual types of operation.

Building construction bulletins

No. 1 Specifications for Lead Waste Connections for Plumbing Fixtures with Integral Traps (Water Closets — Pedestal Urinals — Service Sinks.)

No. 2 Specification for Lead Shower and Safe Pans.

No. 3 Specification for Lead Chemical Laboratory Drainage Systems.

Seamless terne for roofing

Illustrated four-page architectural specification also provides data on strength and weight characteristics and color advantages of terne-plate as roofing.

Design engineering data

Twelve-page publication summarizes all main lead uses, tabulates data.

Oilless bearings — helicopters

Reprint from "Design News" shows use of lead-terne bearings in helicopter. Photos and drawings included.

Nuclear materials

Eight-page reprint from "Materials in Design Engineering" inspects current fuels, controls, moderators, reflectors and shielding.

1000° F bearings

Data on dry high-temperature lead oxide bearings developed by N.A.S.A. Reprinted from "Materials in Design Engineering."

NEW LISTINGS

Decorative finishes for lead

Informative four-page reprint from "Metal Finishing" (1949) describes methods for all finishes and plating methods for lead.

Cutting press vibration

Describes use of lead-asbestos anti-vibration pads to reduce newspaper press vibrations. One-page reprint from "Publication Management" for April, 1961.

A new look at lead

Roundup story from "Ethyl News" presents the newer roles of lead on today's technical front.

Quiet please!

Two-page reprint explaining lead's function as soundproofing material. From "Modern Sanitation and Building Maintenance" April, 1961.

Electric delivery trucks

The facts and figures about battery powered street delivery trucks for milk, bakery and other routes. Reprinted from "Food Processing" March, 1961.

UPON REQUEST, THE LEAD INDUSTRIES ASSOCIATION WILL BE GLAD TO MAIL "LEAD" REGULARLY, FREE OF CHARGE, TO THOSE INTERESTED, AND WILL COOPERATE WITHOUT OBLIGATION IN THE SOLUTION OF YOUR LEAD PROBLEMS.

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