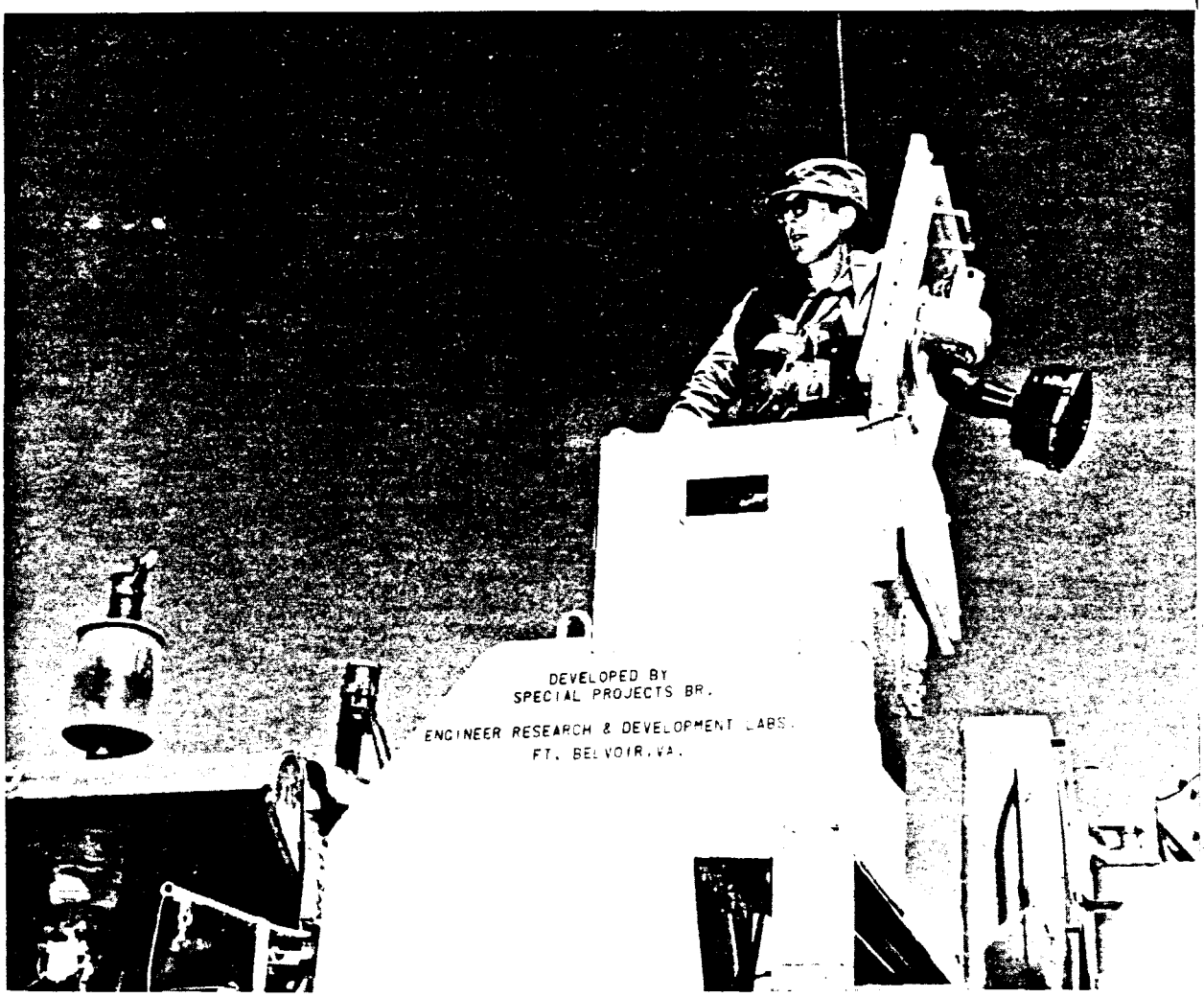
Lead

VOLUME TWENTY-FOUR 1960 NUMBER THREE



Once inside the lead-shielded cab of this Army-developed bulldozer, its operator will be able to operate the machine in fallout areas with safety. Lead glass windows and filtered air intake complete his protection. **(see page 5)**

TERNE: *An Architectural Rediscovery*

". . . I have furthermore found terne superio oth color-adherence, heat-reflection, permanenc workal

Rarely does a two-century-old building material rate editorial coverage in newspapers and technical journals. Yet today, terne roofing — substantially unchanged from its invention in 1720 — is the focus of just such attention.

"Substantially unchanged" but now produced in 50-ft. seamless rolls, the material is gaining new adherents rapidly. In this new form it is easily and economically applied — typical installed costs range from 50 to 75 cents per sq. ft. Of unquestioned durability, terne is one of the lightest and strongest roofing materials known. It is thoroughly waterproof and hailproof and survives windstorms unscathed, even when neighboring roofs of other materials are curled and torn off.

Not the least important of its attributes is terne's ability to accept and hold ordinary exterior paints. In combination with the variety of seam patterns of the roof, this unlimited color potential can lead to striking effects. In Frank Lloyd Wright's words, "Because of its inherent adaptability in both form and color, terne permits the visible roof area to become a significant part of the structural design."

Wright used terne fairly frequently —some of the outstanding examples have been the Dobkins residence, North Canton, Ohio, the Fasbender Clinic, Hastings, Minn., a weld chapel at the Claremont Hotel Berkeley, Calif. Still more recently prefabricated design by Frank Ll Wright, incorporating a terne r was erected on Staten Island.

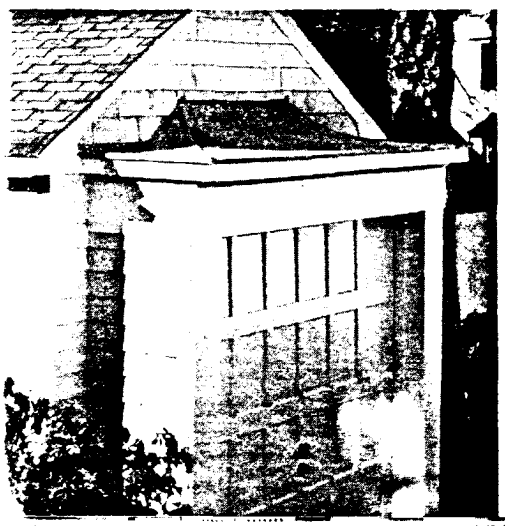
Terne roofing is the lightest dura metal roofing now in use. The common grades of terne, for exam weigh 62 and 76 lbs. per sq. ft. laid. Even wood shingles weigh m (200 lbs. per 100 sq. ft.) than t and the common built-up gravel r weigh about 600 lbs.

Since thermal expansion is alwa a factor in roofing design, terne h another advantage in showing 0.825 inches of linear expansion

100 ft.
re Th
metallic
than l
pansion
0.096 f
igure f
Desp
the stro
In addi
it does
Terne
of 45.0
often
valuabl
cases w
burn
k
fire in
served
and pr
to othe
A t
to insta
wood
Rosin-
tween t
terne i
lengths
eaves.
Inst
plate.
to the
standi
strips.
Sinc
can be
of bui
able.
tage ir
reflect
over
examp
of the
two t
painte
cent o

Roof garage extension with sheet lead

Like many another garage this one had been built well enough to outlast the automobiles it was designed for. Wheelbase lengths stretched and the original back wall of the garage was knocked out to make room. When, years later, the length of cars had grown so that even this space wasn't enough, the doors were torn out and an extension was added to the front of the garage.



Unlike the concealed shed at the rear, the garage front extension is visible from the street and had to be finished so as not to mar the attractive suburban site. In order to achieve the right effect—and to gain permanence with a minimum of time, labor and expense—the extension was built with a curved, sloping roof frame and sheathing and covered with 2½ lb. hard lead sheet.

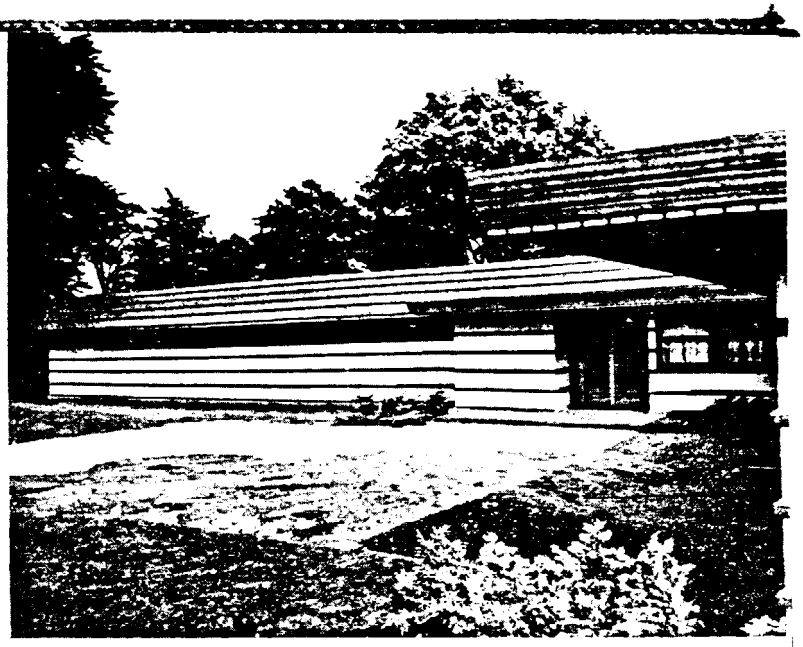
Since the lead was fitted up under existing cedar shingles above the new roof, no separate flashing was needed to prevent seepage into the existing front wall. The sheet lead was precut from paper templates, laid right in place and given a final trimming. Then, after a few shingles were removed to fasten copper cleats in place, the lead was worked up under the shingles, crimped over its cleats and dressed down.

Seams at the two hips were formed by bending both edges up and loosely folding them over. Then a preformed cap of the same material was slipped over the edges and dressed down to make a capped loose locked seam. Edges were turned down to cover wood framing and form drips so that no moisture could penetrate below sheet lead covering and two small flashings at the top of the seams were installed to complete the job.

No painting was necessary, either for protection or to make the new roof blend into the scheme. In color and line it matched a small lead roofed cupola previously added to the garage.

LIA26213

e super[illegible] other roofing materials in economy,
rmanen[illegible]orkability and low coefficient of expansion."
— Frank Lloyd Wright



The Kass residence on Staten Island. The prefabricated house designed by Wright, makes use of a terne roof. Note how the pleasing horizontal lines are continued in the roof of the structure and how roof color can be made to harmonize the whole exterior appearance.

St. Luke's Wedding Chapel at the Naval Academy, Annapolis. Terne is used here for the barrel vaulted roof. Architects: Rogers, Taliaferro and Lamb, of Baltimore.

Georgia Tech's Alexander Memorial Arena, designed by Aeck Associates, shows seamless terne roofing designed to harmonize with the surrounding compus. The roof, 270 feet in diameter, is set on 32 arched girders.

. a wed
nt Hote
re recen
Frank l.
a terne
sland.
ghtest dur.
use. The
, for exa
per sq. f
s weigh
ft.) than
p gravel

sion is al
ign, terne
showing
expansion

ere re-
place.
ler the
its and

formed
loosely
formed
slipped
own to
seam.
cover
so that
below
o small
ns were

either
new roof
olor and
roofed
garage.

ft. for 100° change in tempera-
This is the only commonly used
allic roofing material with less
1 inch per hundred feet of ex-
n and it comes the closest to the
figure for slate or 0.331. the
for wood.

spite its lightness, terne is one of
strongest roofing materials known.
dition to its high tensile strength
s not tend to crack or creep.
roofing has a tensile strength
000psi. This high strength has
been sighted as particularly
le in fire resistance. In many
when fires under the roof have
the supporting timbers com-
away, the terne roofs have been
to remain suspended over the
ome piece and have actually
as a blanket to smother the fire
event sparks from spreading it
r buildings.

typical construction method is
all the terne plate roofing over
sheathing or ½" plywood.
sized building paper is used be-
the metal and the sheathing. The
cut from rolls in continuous
running from the ridge to the

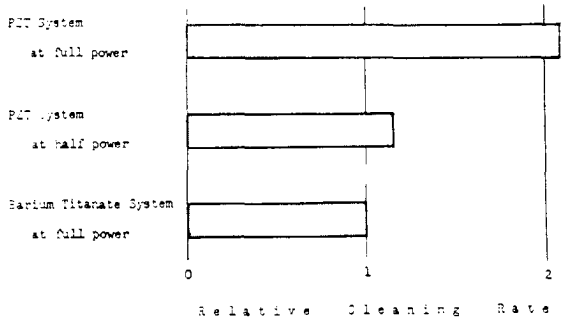
od of nailing through the terne
ats of the material are nailed
ding and incorporated in the
or other seams between

virtually any color of paint
sed on terne, a wide variety
color schemes is avail-
e is a considerable advan-
me applications to the high
possible with light colors
plate. White paint, for
will reflect about 80 per cent
heat falling on it; yellow,
For reference, a roof
k may reflect only five per

LIA26214

ULTRASONIC CLEANING

New Better Bustling



The violent collapse of millions of bubbles literally blasts off dirt, grease and corrosion in seconds in an ultrasonic cleaning tank. This powerful cleaning action, termed cavitation by the engineer, has carved an important place in industry for ultrasound.

High cleaning speeds and the ability to remove insoluble solids and contaminants from inaccessible areas in complicated parts and assemblies have made this cleaning method a natural for manufacturers of precision instruments and machinery and other areas with difficult cleaning problems.

Now, the ultrasonic cleaning industry is set for a new spurt of growth. Branson Ultrasonic Corp. of Stamford, Conn. has introduced an ultrasonic cleaning system based on lead zirconate-titanate — a high efficiency, high Curie temperature piezoelectric ceramic — with cleaning rates more than double the old barium titanate type.

Higher cleaning rates mean that equipment can be designed to do the same job as a barium titanate system at a 30 to 40 per cent reduction in initial cost.

Because of a new transducer design concept—a sandwich design—replacement costs of the transducer assemblies has also been significantly cut. Other advantages for the system cited are a 40° rise in continuous operating temperatures to 200°F, ease of maintenance, and flat tuning characteristics reducing the need for close frequency control of the generator.

Branson's low cost system is set, in the words of Sales Manager Harry Osterman, for "more high volume, low cost applications including maintenance of street lights, high-speed degreasing and pickling of metal, wire, bar and strip to name a few."

Low cost ultrasonic cleaning can be a cost reduction boon in a basic metal plant like a steel mill. Fitting right into automated production methods, the high cleaning speeds of ultrasonics keep production rates up. A bonus in some cases is the reduction or elimination of cleaning liquor waste disposal and water pollution problems.

An illustration of the cost saving potential of the use of ultrasound is the equipment developed by Wean Engineering in cooperation with Branson and Pangborn Corp. for the cleaning of steel strip. This process cleans hot rolled steel strip by blasting with steel shot followed by a few seconds in an ultrasonic bath. Original plans called for a flash pickle treatment of the shot blasted strip.

Replacing the flash pickle equipment with an ultrasonic system would eliminate 30 feet in the production line and reduce the cost of cleaning the strip by 22¢ per ton on an 80,000 ton per year basis.

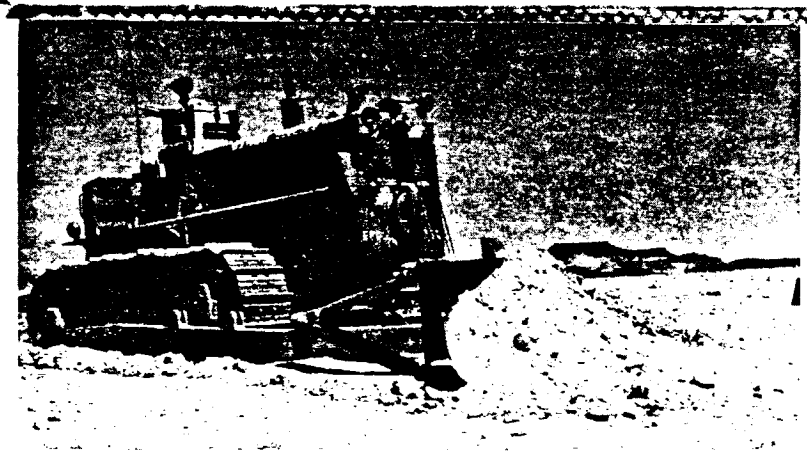
The higher cleaning efficiency of the new system can be ascribed to two main factors.

- First, the efficiency of converting electrical to mechanical power has been measured at 90 percent for the lead zirconate-titanate system compared to 70 percent for the barium titanate system.
- Second, lead zirconate-titanate can take larger amounts of power without danger of depolarizing due to the generated heat.

With barium titanate systems, only a half wave pulse could be used to drive the transducers because of the danger of overheating and depolarizing the ceramic. A full wave driving system would double the number of pulses of the same intensity in the same time span, literally doubling the cleaning power of the bath. Lead zirconate-titanate with its higher Curie temperature and higher efficiency can take the punishment of the full wave system.

One of the problems with the old barium titanate system which stimulated the development of the new system was the difficulty in repairing transducers at a reasonable cost. The sandwich design solved this problem. Using only thin sections of the lead zirconate-titanate, the resonant frequency of the sandwich is controlled by the dimensions, mass and acoustic properties of the sandwich materials.

Because of their novel construction, these sandwich elements may be completely reclaimed from a worn out transducer housing. They are simply transferred to another housing. Life of a transducer housing is generally 7,000 to 10,000 hours of operation, due to cavitation erosion. The old style of transducer assembly generally had to be replaced completely. But for the new sandwich design, cost of repair is only about 20 percent of the initial transducer investment.



Radioactive rubble is no great peril to the driver of this Army bulldozer. A lead-shielded cab protects him from gamma rays.

After inspection and start up, the driver climbs into the cab and latches the counterweighted hatch closed over him. Note the leaded glass window and filtered air intake.

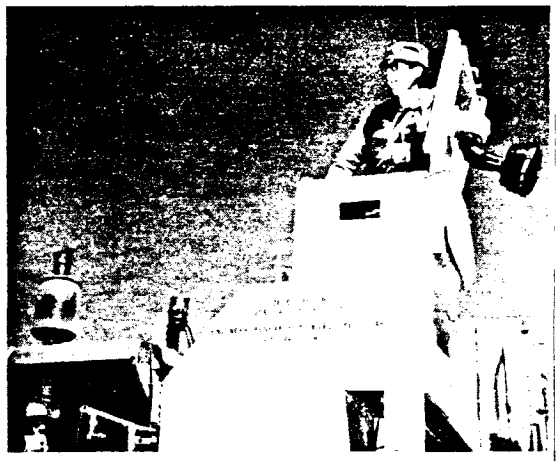
ARMY DEVELOPS SHIELDED BULLDOZER

Anticipating the need for a quick cleanup in event of any nuclear catastrophe, the Army's Engineering Research and Development Center at Ft. Belvoir has built a shielded bulldozer. Using it in safety, a driver could clear a path through fallout laden areas, remove debris from critical centers.

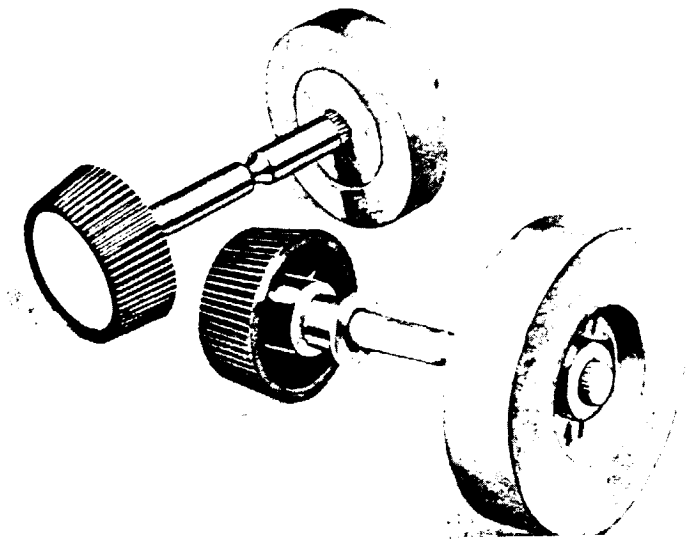
Since the mechanism of the dozer itself remains undamaged by radiation, the Army's principal concern is for the safety of the operator. To protect him, Army engineers have devised a cast lead shield for the cab. It weighs about 9,000 lbs. All four sides have leaded glass windows to permit full observation. In addition, the cab is equipped with an air filtering intake device for ventilation. In all, the shielding attenuates 95-98 per cent of the incident radiation.

Inside the shield the driver can operate controls in the usual manner. He is equipped, too, with radiation meters to allow him to survey the area he is passing through.

Installation of the shield takes about half an hour. Three men using a crane can do it. Since this prototype was developed, modifications have been made and an advanced version is currently under test.



AN OUNCE OF LEAD AIDS FINE TUNING

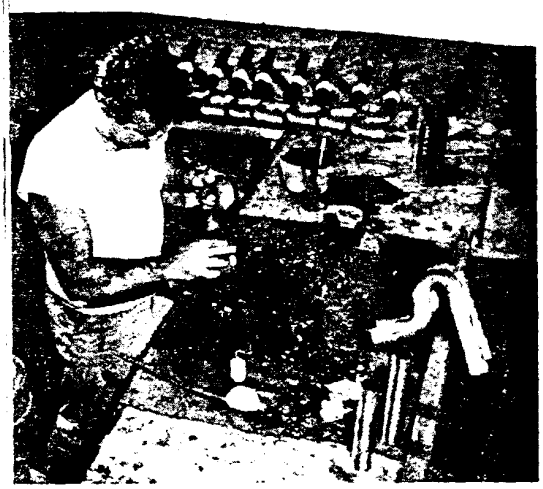


LIA26216

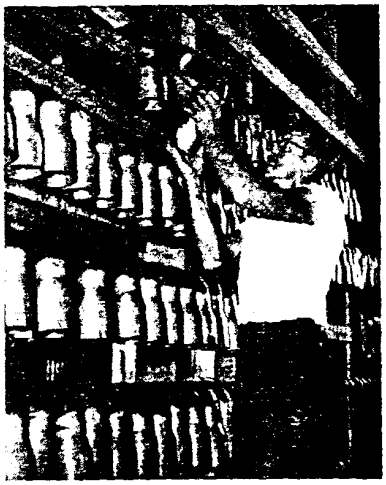
Thousand pound lead weights, written up in the last issue of LEAD, are used to attain hair splitting accuracy in the alignment of transmission lines for the world's largest radio telescope. An ounce of lead has its place in achieving fine tuning, too. Three sizes of antimonial lead flywheel (4 oz and 8 oz) are being produced by The Staver Co., Inc., in Bay Shore, Long Island, N. Y., for incorporation in high-fidelity tuners.

The lead flywheels are press fitted to splined shafts controlling the tuner of precision electronic equipment. In place, the flywheel contributes an inertial "heft" which permits extremely fine tuning on the first try—without searching and back tracking in fine adjustment of the tuning knob.

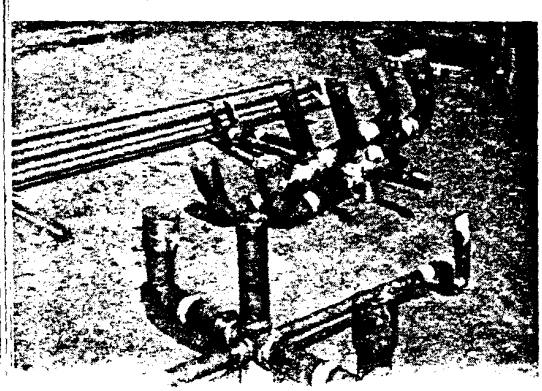
Levittown and Lead



Traps and bend are wiped by experts and then . . .



. . . put into storage 'til needed. Complex assemblies (below) are stored, too.



There are 17 Springfields in the United States. But this most common name for a town may one day take a back seat to a new town name — Levittown. The popularity of the Levitt method of building has created a success which is closing the gap despite Springfield's start of a century or so. The third Levittown of 16,000 homes and all the usual community facilities is well along in New Jersey.

Ground was broken this summer for a new Levitt-built community — Belair — in Prince Georges County, Maryland, 12 miles northeast of Washington, D. C. This self-contained suburb, planned to serve the nation's capital, will have about 4500 homes and a population approximating 20,000 at completion.

While the grand scope of Levitt's methods is novel, the technique of building follows well-established paths. Borrowing one detail from the contemporary scene, the Levitt houses are erected on a poured concrete foundation slab. But pre-cut framing members are put together on the site. The use of lead fittings in the drainage plumbing exhibits both sides of this old-new approach.

Traditionally, of course, lead fittings are known to be reliable. This is especially important in poured slab construction because these parts of the drainage system are inaccessible beneath hard, solid concrete. Proof of lead's merit in this regard is the fact that of the thousands of Levitt homes built so far at the three different sites, all of them have had lead fixture connections and hardly a handful have had to have their slabs broken into for repair.

The other facet of lead so important to Levitt is a well-established property of lead piping, too. This is lead's flexibility. It is put to work in this newest of the Levittowns, Levittown, N. J., to provide the highest quality plumbing at a cost to the buyer that is competitive with any plumbing material he might choose.

All of the fittings that connect the bath fixtures and water closets to the drainage system are lead. These include 1½ and 2-in. P-traps for the bathtubs and shower stalls and lead reducing bends, 4-in. inlet and 3-in. outlet, under the water closets.

The major portion of the plumbing drainage system is shop fabricated. In the shop, under ideal working conditions, scores of hundreds of these lead fittings are connected to the drainage piping and assembled into whole components.

These components are delivered to the homesite and placed in position and it is here that Levitt takes full advantage of the economies possible through lead's flexibility.

These economies come into play in connecting the fixtures to the roughing-in. The inevitable descrepancies of an inch or more can easily be corrected with lead simply by realigning the lead connection to fit the planned layout. On the other hand, were rigid piping used, it would necessitate removal and reworking of the entire assembly. Thus with lead connections the plumbing is done once — and done well.

Of the three basic house plans at New Jersey's Levittown, the Cap Cod unit uses two traps and a bend, the Rancher two traps and two bends, and the Colonial, one of each. It is estimated that about 200 tons of lead will be installed in these fittings by the time the project is complete two or three years from now.

LOOK AHEAD WITH LEAD

HERE COME THE ELECTRIC TRUCKS

Before long you may be seeing silent electric delivery trucks in your home town. They are in regular service in Atlantic City and Cleveland now and they've been tested in other cities. The noisiest activity of their driver on an early morning milk route will be the clink of empty bottles as he collects them. The truck itself makes hardly any noise. And it never sits at the curb idling.

This, indeed, is one of the biggest reasons dairies, bakeries, laundries, and delivery services are interested in electric trucks. On an average home delivery route, a gasoline-powered truck spends so much time sitting at the curb idling that it gets only four or five miles to the gallon.

Besides the cost of gasoline and oil, this adds to the maintenance problem with gasoline-powered trucks. Modern engines are not designed for long periods of running at no load and low speed. When they spend this much time at the curb, maintenance bills mount.

In a test at a dairy in Atlantic City, N. J. it was found that on typical routes the cost of "fuel" (recharging the batteries) amounted to just about 2.5¢ a mile. Contrast this with a gas-and-oil cost of 3.66¢ on the same routes. Another test, in Ohio, showed 1.5¢ per mile for the electric against 7.7¢ for gasoline. More important, these tests indicated that maintenance for the electric would be about $210 a year — $200 for labor, $10 for parts. The gasoline-powered truck gobbles $640 a year for maintenance even without counting the two major overhauls it goes through in its lifetime.

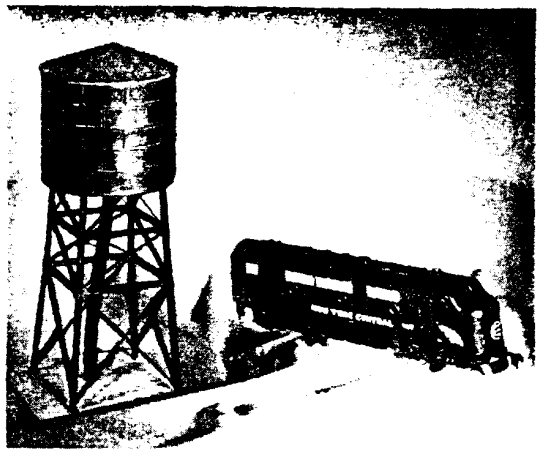
Even in the relatively small costs of keeping a truck on the road, electric vehicles come out well ahead. License plates in Pennsylvania, for example, cost $35 instead of $70. Annual tire cost dropped $100 because of smooth starts. Insurance rates were cut from $420 to $263 because the electric is "off" when it's stopped and can't run away.

If consumers like the quiet service and owners the lowered cost, what about the drivers? They like the truck, too. With no clutch or gear shift — there is a "reverse" lever — they find that they are less tired at the end of a run. And, by taking all the fuss out of driving, the electric truck gets them back to the garage ahead of normal schedules.

LI426218

Model-making, anyone?

If you have an interest in model-making, be it professional architectural models or a once-a-year stint with an HO railroad, lead tape (reviewed two issues ago) is a godsend. Available in various widths in a standard 4 mil thickness, it is self adhesive, soft enough to be cut with scissors or razor, and can be tooled with nothing more than a sharp pencil. The scale standpipe shown was made with a 3 in. diameter mailing tube and the riveted steel plate made by tooling ½ in. tape to form scale 4 x 8 ft plates.



THE *lead* LIBRARY
of Technical Information

The following articles and reprints contain information, drawings and specifications on the use of lead products helpful to architects, engineers and others interested. They are available free of charge except where otherwise indicated, upon request to the LEAD INDUSTRIES ASSOCIATION, 292 MADISON AVE., 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.

USE LEAD TO CONTROL CORROSION
Latest practices in lead construction for the petroleum refining industry are described. How to avoid the difficulties sometimes experienced with lead-lined equipment. Reprinted from "Petroleum Refiner," April, 1958.

MATERIALS of CONSTRUCTION REVIEWS
Lead and lead alloys in design and construction research, engineering and technological applications. With bibliography, 1959, 1958, 1957 and 1956 reviews (editions are not cumulative) are available. Reprinted from "Industrial and Engineering Chemistry," September, 1959, 1958, 1957 and 1956.

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.

FLASHING WITH HARD LEAD
A complete "How-to-do-it" article on the use of hard lead in roofing and flashing. Reprinted from "American Roofer & Siding Contractor," December, 1958.

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.

LEAD IN MODERN INDUSTRY
$1.00 Postpaid
A fully illustrated 230 page, cloth bound book describing all phases of the production and use of lead, lead alloys and lead compounds.

ANODES FOR SHIP PROTECTION
Results of a detailed examination of lead-silver anodes for corrosion protection of ships. Operating efficiency and behavior are given. Other anodes are compared. Reprinted from "Corrosion," November 1959.

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.

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
A series of specifications for the use of lead in building construction. (Available separately.)

No. 1 Specification 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 terneplate as roofing.

ISOLATE COOLING TOWER VIBRATION
An installation of lead-asbestos anti-vibration pads to isolate a roof-top cooling tower on a new office building is reviewed. Sectional drawing and loadings are given. Reprinted from "Plant & Power Services Engineer," March 1960.

NEW LISTINGS

LEAD VS. NOISE & VIBRATION
Review of the current growth in lead-asbestos pad, sheet lead, and leaded plastics for sound and vibration control. Reprinted from "Steel," July 25, 1960.

LEAD-PLASTIC SOUNDPROOFERS
Rundown of several types of leaded plastic and their producers. Wide range of sound control uses is given. Reprinted from "Chemical Week," August 27, 1960.

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.

LIA26219

165

PRINTED IN U.S.A.
PUBLISHERS PRINTING — ROGERS KELLOGG CORP.
LONG ISLAND CITY 1, N. Y.