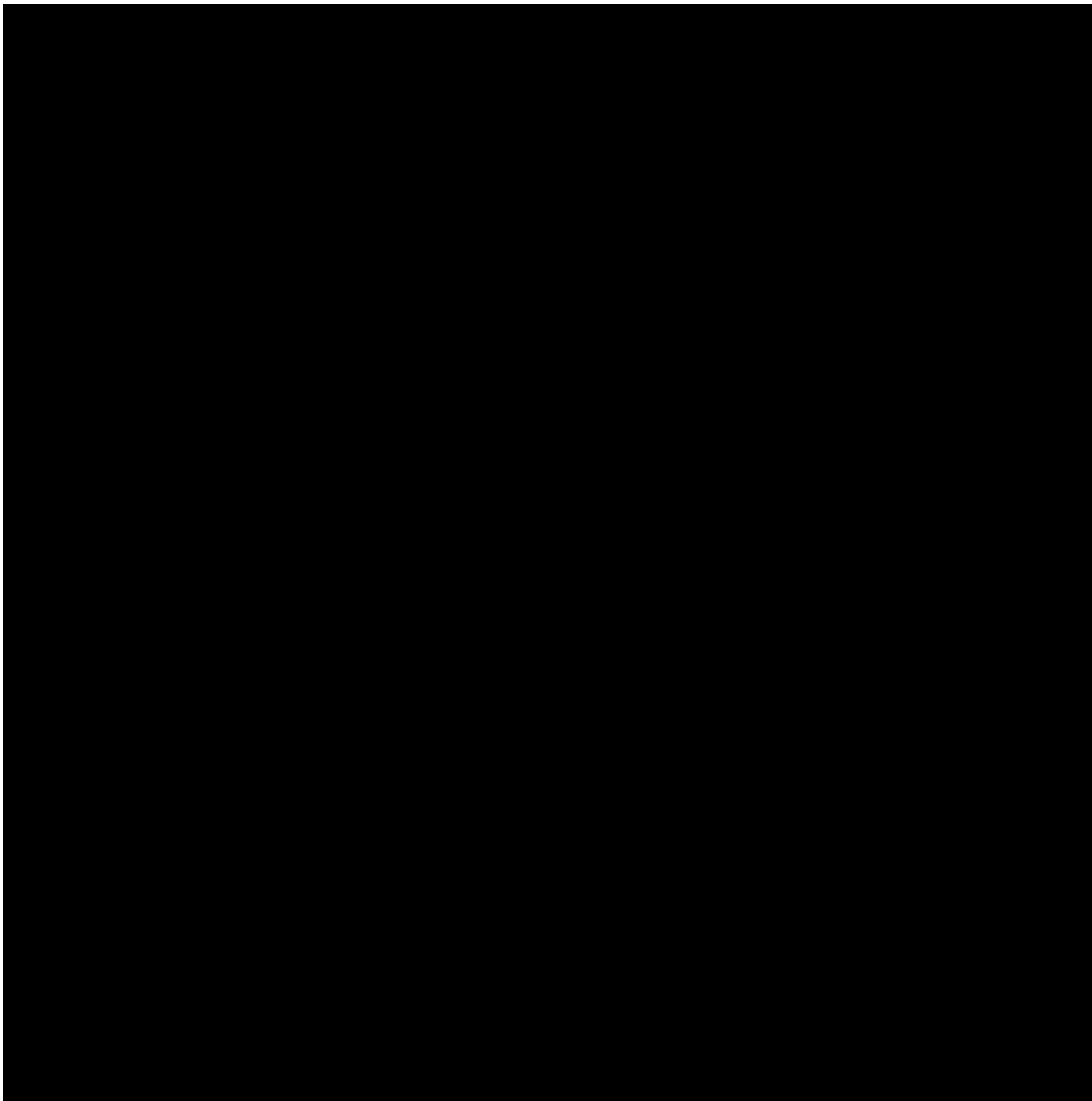


Inspection Reveals Ancient Wrought Iron Work Was Primed With Red Lead Paint

The gates and fences of the Miles Brewton house (c. 1760), in a perfect state of preservation, show indications of a priming coat of red lead in worn spots around the latch.

THE ironwork of Charleston, South Carolina, has for many years been the subject of admiration and study by architects and ornamental iron designers but the fact that it has survived nearly 200 years in a humid seacoast atmosphere seems to have been accepted as a matter of course. Actually this survival has been made possible largely by paint even though the material of which they were made was probably hand puddled wrought iron.

It could be safely assumed the smiths who created the gates and fences which we now admire so much primed them with red lead paint before they left the shop since red lead-linseed oil paint was then, as it is now, the standard metal protective paint for ironwork. It is interesting to find that such an assumption seems to be correct. A recent inspection of nearly twenty examples including some of the best known pieces indicated that they all had a coat of red lead paint next to the iron.

It is unfortunate that it was possible to find the evidence of the use of red lead only because maintenance schedules have been disrupted by wartime conditions but this condition will without doubt be remedied in the very near future. It was possible to find on every gate or grille examined, one or more places where the protective paint had been damaged. In most cases such damage was in the form of scratches or nicks which revealed the presence of red lead. On one or two gates the top coats of black paint had been worn down by the hands operating them until the primer was exposed, but in every case the unmistakable color of red lead was definitely in evidence.

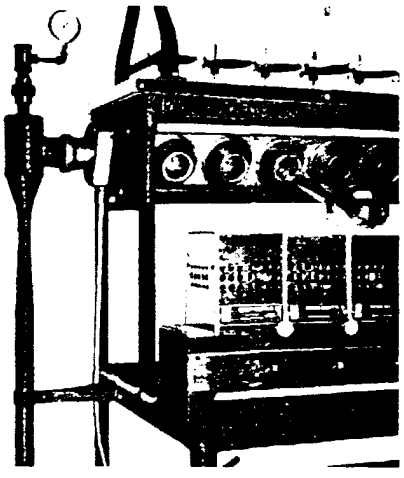
It is not possible to say for certain that the red lead now on the gates was applied when the gates were new but it is not unreasonable to so assume. Most of the surfaces are smooth and unpitted and show little or no evidence of corrosion damage. They have been well protected throughout their life and it is certain that the rust inhibitive properties of red lead have played an important part in keeping them so.

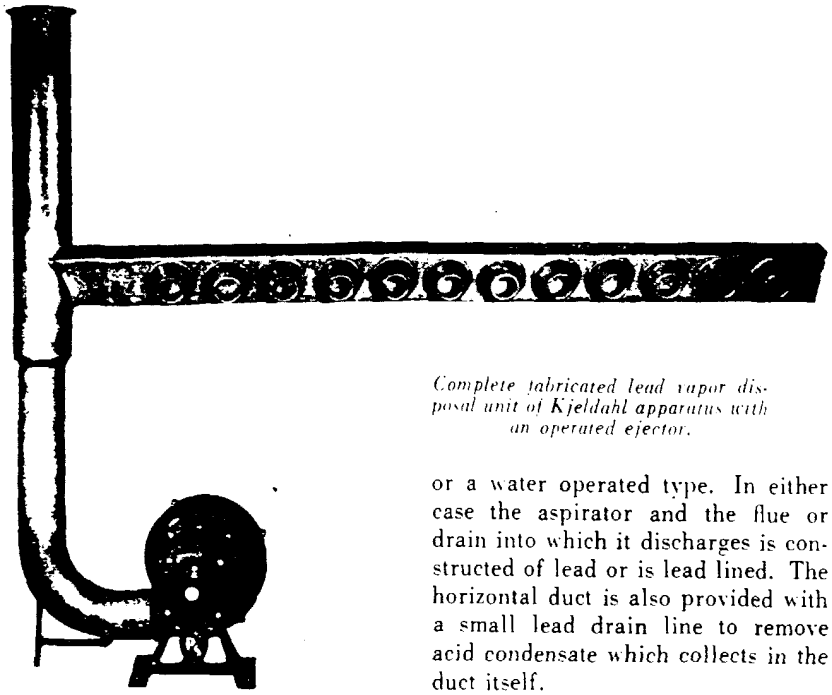
Intricate Lead Fabrication A Part Of Kjeldahl Nitrogen Determination Apparatus

WHENEVER corrosive materials or vapors are to be handled lead will almost invariably be found doing a heavy share of the job both in plant and laboratory. An interesting piece of such laboratory equipment is shown in the accompanying illustrations. It is known as the Kjeldahl apparatus. It is used for nitrogen determinations in food, soil and fertilizer chemistry laboratories.

The testing process involves the digesting of the sample by concentrated sulphuric acid and it is in the disposal of the fumes of this digestion process, which is conducted at slightly elevated temperatures, that the corrosion resistant properties of lead are made use of. The samples, in long necked glass flasks are placed over heating units with the mouths of the flasks resting in conical lead collars welded to a horizontal sheet lead duct. A moderate suction is induced in this duct by an aspirator which may be either an air operated

Kjeldahl unit showing flask mouth in lead collar. Water operated aspirator at left is lead lined.





Complete fabricated lead vapor disposal unit of Kjeldahl apparatus with an operated ejector.

or a water operated type. In either case the aspirator and the flue or drain into which it discharges is constructed of lead or is lead lined. The horizontal duct is also provided with a small lead drain line to remove acid condensate which collects in the duct itself.

The duct-aspirator unit of the Kjeldahl apparatus is an intricate assembly of leadwork which is made to precise dimensions and which must be gas and liquid tight in all of its joints. The duct which is approximately semi circular in section is an extrusion. The collars are spinnings welded in place. The flue and air supply pipe are also extrusions but the conical parts inside the aspirator are formed by hand from sheet lead and welded in place.

The Kjeldahl process is named for its developer. J. Kjeldahl. a Danish chemist. The apparatus shown in the photographs is a product of the Precision Scientific Company of Chicago.

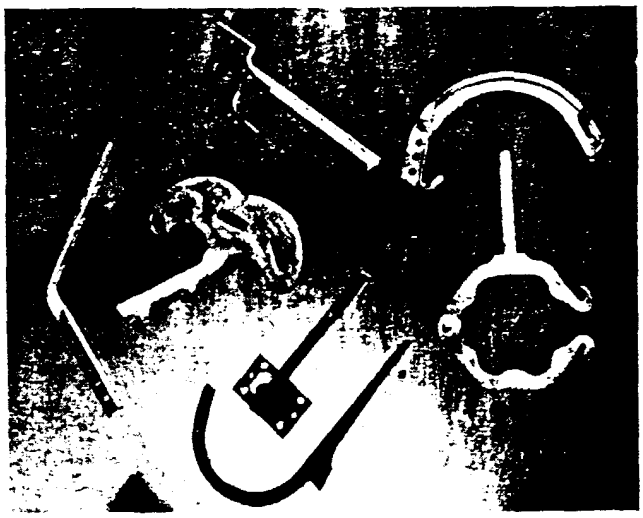
Use Of Lead Coatings On Steel Increasing

ALTHOUGH the wartime interest in hot dip lead alloy coatings on iron and steel was due. in part. to the need for a substitute for zinc. this interest has continued to increase under peacetime conditions. Lead coatings have advantages which make them especially desirable under many conditions.

For corrosion resistance lead alloy coatings show up especially well in industrial atmospheres which are generally acid in character. They are ductile and do not tend to crack and spall when the base metal is beint or otherwise distorted. Because the melting point of lead is comparatively low the dipping process has little tendency to cause warping of fabricated parts and it is usually possible practically to eliminate the "tear drops" or thick areas of coating material on the bottom edges of the coated article.

In addition. lead alloy coatings are completely adaptable to painting. Lead is compatible with the commonly used exterior paints. not only because they usually contain lead pigments but because the products of chemical reaction between the metal itself and the paint vehicles are not brittle. Lead coated articles require neither a special metal-priming paint nor a pre-painting treatment. In fact the lead coating may be regarded as a priming coat in setting up the painting system.

There are an increasing number of job shops doing lead alloy coating as well as several manufacturers who have installed dipping lines for their own products. A wide variety of products are being coated commercially including bolts and nuts. washers. gas meter connections. mop handle parts. springs and plating baskets as well as the roofers hardware illustrated on this page. Other items under investigation show interesting possibilities in several lines.



Lead coated steel gutter and downspout fastenings and snow guard.

DAYTON SNYDER

Lead Bends And Stubs for Closet Connections Provide Sanitary And Mechanical Safety

THERE are two principal reasons for the use of the lead bend or lead stub for connecting the water closet to the rigid framework of the plumbing rough work. These reasons, in the order of their importance, are sanitary security and flexibility. The sanitary security afforded by the lead connection is twofold. In the first place, the connection is accomplished by soldering or welding to the lead a rigid floor flange which is in turn bolted to the closet bowl. This bolted joint, provided with an asbestos gasket, makes a permanent secure joint between the bowl and the lead pipe. In the second place, the nature of the lead pipe, that is, its internal smoothness and the easy curve of its bends, accelerates the flow of waste and discourages the formation of clogging deposits.

The flexibility of the lead connection assists in maintaining the tight connection between bowl and stack and at the same time protects the relatively fragile fixture from breakage by permitting the inevitable movement between stack and structure to take place without imposing excessive strain on joint or fixture.

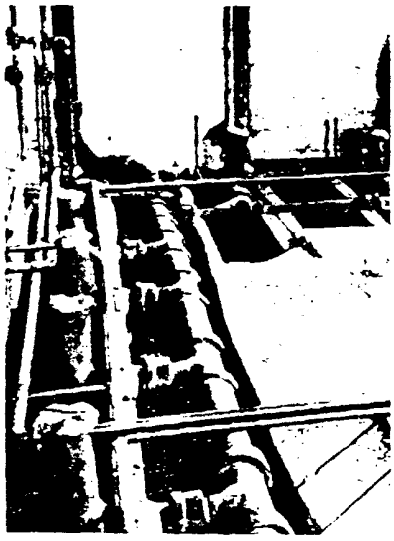
Extra long lead bends save fittings and speed construction in Fort Smith, Arkansas, apartment.

Lead bends and lavatory wastes in toilet room of American Airlines building in Tulsa, Oklahoma.

tended without difficulty if conditions require it and even after the bend is securely calked into the cast iron fitting the location of the inlet can be adjusted if desirable.

If the three inch stack, which is still permitted in some localities, is being used the necessary reduction in pipe size can be best taken care of in the lead bend by using the eccentric reducing bend which is flush on the bottom throughout its length. This type of bend, like all other lead

Lead bends in a remodeling job in Corpus Christi, Texas.



Some of the lead bends in a new toilet room in a college building in Middletown, New York.

These two points are sufficient to justfy the usual requirement by plumbing codes that a lead water closet connection be used but there are other reasons why it is desirable. The lead connection, either bend or stub, is easily adaptable to varying installation conditions. It may be obtained in varying lengths which can be cut by the plumber to the exact dimensions thus making precise location of the fixture possible regardless of the stack position. It can be ex-

plumbing supplies, can be obtained bearing the Lead Industries Association's Seal of Approval which assures the purchaser that the material conforms to the rigid standards of the Association which are identical in substance with the Commercial Standards of the National Bureau of Standards. The standards of the association will also be found to be closely in agreement with Federal Specification WW-P-325 which was issued subsequently to the promulgation of these standards.

Lead stules in toilet room of a factory building under construction in Dallas, Texas.

Lead bends and drum traps in a new toilet room in an office building in Tulsa, Oklahoma.

The requirement by the plumbing code of a lead bend or a lead stub connection for water closets is quite general in cities throughout the United States. It is an effective means of providing protection against breakage to fixtures as well as insuring sanitary protection to the property owners of the community.

Unusual Sheet Lead Garden Detail Of Interest To Landscape Architects

AN interesting and unusual use of lead is shown in the photographs on this page taken in Brookgreen Gardens, a beauty spot some 20 miles north of Charleston, South Carolina. These gardens, open to the public, were restored and developed since 1930 by Mr. and Mrs. Archer M. Huntington and are now operated by a trusteeship and maintained by an endowment and they constitute a veritable botanical museum as well as a lovely setting for a collection of contemporary sculpture. Some of the box and live oak are over 200 years old and there are crepe myrtle bushes known to be more than 100 years of age.

The central feature of the gardens is a large pool which is supplied from

The light grey of the weathered lead drainage trough is a pleasant contrast to the deep greens of lawn and box trees.

DAYTON SNYDER

the nearby river by pumps. Leading from the overflow of this pool is a series of lead lined shallow brick troughs or ditches which extend in a network over the entire area of the gardens. These lead lined troughs serve not only as a means of disposal for the overflow of the pool but also as irrigation ditches for the flowers and shrubbery. When it is desired to water a certain area the adjacent ditch is dammed with a small bag of sand which forces the water to overflow on the surrounding soil.

The use of lead for this purpose adds an interesting note of color and texture to the garden and at the same time provides positive control of the irrigating water. The ditch is not subject to leakage through cracks or joints which are bound to occur in masonry.

Cast lead swans "float" calmly on the surface of the central pool.

During the war years the work of the landscape architect has been, of necessity, confined largely to the planning of housing communities and similar projects and he has had few opportunities to ever think of gardens. In the future, however, he can look forward to the type of work where both the utilitarian and the ornamental properties of lead can be used to enhance the usefulness and beauty of his creations.

Sprayed Lead Coating To Protect Ancient Carved Wood Sculpture

THE sculptured figure in the accompanying illustration is an ancient wood carving which has recently been repaired and given a sprayed lead coating to protect it from the ravages of weather and decay. This figure has in the last 102 years graced the facades of several buildings which have, during that time, housed one of New York City's prominent business establishments. It has, through the years, acquired a sentimental value far in excess of the cost of its replacement so when signs of decay indicated that it was in danger of destruction by the forces of nature, the firm made arrangements for its repair and permanent preservation.

The statue was removed from its perch on the building and thoroughly repaired. All dry rot and other damaged wood was removed and new feet of cast lead were attached. Then the entire figure was covered with a coat of lead by a process known as metallizing, which means that a finely atomized spray of molten metal was blown by air pressure onto the surface. Thus the wood was encased and sealed in an envelope of metallic lead which conforms perfectly with every detail of the original carving.

Over the lead was applied a surface coat of copper which was treated to match the color of the rest of the ornamental group. The application of the sprayed metal coatings was made by the Eastern Metallizing Company of New York.

Sprayed lead coatings are employed for many uses. The above described application is typical of the treatment of comparatively soft materials such as wood, plaster, or leather which are to be coated with decorative metals. Lead is applied first to provide adhesion and a body coat. However, lead alone is commonly applied by the metallizing process to less durable metals as a coating to protect against corrosion by atmosphere or chemicals.

Another interesting application of this process is made in the prosthetics manufacturing industry for the manufacture of lead moulds for plastic extremities for artificial limbs. These moulds are made by spraying a thick coat of lead onto a sculptured plaster model after which the plaster is removed leaving a perfect mould for the hand or foot.

Metallizing has been found to be a practical means for the application of lead for protection of metals from severe corrosive conditions as well as a solution for these special problems.

Hundred year old wood carving spray coated with lead for protection against weathering.

A Portfolio of American Landmarks

No. 40

Glastonbury Connecticut

IN December, 1689, those inhabitants of Weathersfield, Conn., living on the east side of the Connecticut River were granted permission to establish their own church, provided an orthodox minister could be found, and thus be relieved of the necessity of contributing to the support of the existing church which was at too great a distance from their places of residence. The new church was successful and the community later became known as the town of Glastonbury.

The inhabitants prospered and there remain today a number of fine old houses to demonstrate their excellent taste and sound craftsmanship. Although the hewn timber construction used in the early part of the 18th century was quite different from dimension lumber framing with which we build houses today, the best protective and decorative paints used in those days were even then made from pure white lead and linseed oil. Through all the years white lead has remained the dominant exterior paint pigment and white lead paint has played an important part in preserving these houses and keeping them beautiful. They stand today protected by white lead paint as testimonials to the sound craftsmanship of their builders and to the care which their owners have given them.

Wells-Shipman house, built in 1743 of timber construction. Pure white lead paint has helped to preserve the unusually fine detail of cornice and entrace.

The Wells-Shipman house which is painted inside as well as out with pure white lead paint. This corner cupboard is an interesting detail.

Michael Grisuold homestead has both white and tinted white lead paint for a protective coating.

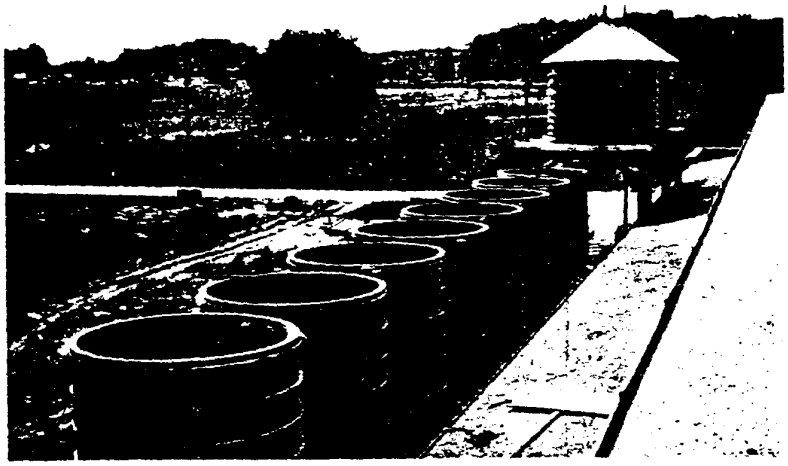
PHOTOS BY DAYTON SNYDER

THIS IS NO. 40 OF A SERIES REPRESENTATIVE OF THE MANY AMERICAN LANDMARKS IN VARIOUS SECTIONS OF THE COUNTRY THAT ARE PRESERVED FOR THE FUTURE WITH PURE WHITE LEAD AND OIL PAINT. MANY OF THEM HAVE ALWAYS BEEN PROTECTED WITH THIS RELIABLE MATERIAL ACCORDING TO AVAILABLE RECORDS.

Lead Lined Tanks For Sulphuric Acid

THE storage battery manufacturing industry, being a large consumer of sulphuric acid, makes extensive use of lead in handling this raw material as well as in the actual construction of the batteries themselves. The accompanying illustration shows a group of lead lined wood tanks used by a battery manufacturer for storage and cutting of sulphuric acid for use in the product.

The two large tanks on the upper level are of conventional vertical stave construction except that they are elliptical in plan, 12 ft. wide, 15 ft. 6 in. long and 8 ft. deep. These are storage tanks for the high gravity acid as received from the manufacturer. The eight smaller tanks are to be used for "cutting" the acid, that is, mixing it with water to the proper specific gravity for use in the batteries. These tanks are assembled with blocking between the staves so that part of the lead lining is exposed to the air. This is to permit rapid dissipation of the heat generated during the mixing cycle. These tanks are cylindrical, 8 ft. 6 in. in diameter and 8 ft. 6 in. high.



In foreground, lead lined tanks used for diluting high gravity sulphuric acid stored in two elevated tanks in background.

All of the ten tanks are lined with sheet lead turned out and down over the top edge. All seams and joints are welded. In addition, the steel tie rods are protected from spilled acid and fumes by being encased in lead pipe before they were applied. Sheet lead shields cover all of the malleable iron joining lugs on the tie rods. Also, each of the transverse beams of the steel supporting structure is protected by a cover of sheet lead.

The tanks were made by the Hauser Stander Tank Company of Cincinnati, Ohio, who assembled them in place and executed all of the lead work. Similar installations for other battery manufacturers have been made in various parts of the country. Lead is an indispensable metal in the storage battery manufacturing plant as well as in the battery itself.

The following articles and reprints contain information, drawings and specifications on the use of lead products helpful to architects, engineers and others in the construction industry. They are available, free of charge, upon request to the Lead Industries Association, 420 Lexington Avenue, New York 17, N. Y.

PROPERTY PROTECTION WITH WHITE LEAD PAINT
A 28 page booklet on the protective value, durability and beauty of pure white lead paint with quantity estimating tables, formulas and mixing and tinting instructions for exterior and interior use.

RED LEAD FOR STRUCTURAL WORK
By Dr. L. L. Carrick, Director, Red Lead Research, Lead Industries Association
A discussion of the rust inhibitive qualities of red lead paint and the best means of making use of those qualities for the protection of structural metal. Reprinted from *Engineering News Record*, April 6, 1943.

LEAD CARRIES ITS WEIGHT
By Fred P. Peters
An interesting resume of many of the long established uses of lead plus information on a number of recently developed adaptations of the properties of lead to special purposes. Reprinted from *Scientific American*, June, 1944.

SOME PAINTING PROBLEMS AND THE ANSWERS
By Dr. F. L. Browne, Senior Chemist, Forests Products Laboratory, Madison, Wis.
Reprinted from the *National Real Estate Journal*, Sept., 1939.

LEAD, A METAL OF MANY USES IN THE THEATRE
By J. Leland Benson
A discussion of the many ways, both utilitarian and decorative, in which lead is or can be used in the theatre. *Reprinted from Theatre Catalog 1945 Edition.*

COMMERCIAL STANDARDS:
Calking Lead, CS94-41
Lead Pipe, CS-95-41
Lead Traps and Bends, CS96-41
Official publications by the Government Printing Office of the above Commercial Standards as promulgated by the U. S. Department of Commerce through the National Bureau of Standards, effective June 25, 1941.

FEDERAL SPECIFICATION WW-P-325
For Pipe, Bends and Traps, LEAD
Part 5 of Section IV of the Federal Standards Stock Catalog, official publication by the Government Printing Office.

STAMFORD'S DOUBLE LIFETIME HOME
A complete analysis of hard lead flashing, white lead paint, lead plumbing, plywood and red cedar Certigrade shingle details and installation methods. Reprinted from *American Builder*, July, 1939.

LEAD COATINGS ON STEEL
By Harold A. Knight, News Editor, Metals and Alloys
A thorough discussion of hot dip and electroplated coatings on steel sheet, wire and fabricated products. Reprinted from the November, 1944 issue of *Metals and Alloys*.

LEAD WELDING
By Robert L. Ziegfeld and David M. Borrina
A concise discussion of the process and methods of welding lead sheet and pipe with descriptions of tools and procedure. Includes brief historical notes and a list of commonly used corrosive chemicals with notes on their reactivity with lead.

LEAD X-RAY SHIELDING
A graphic chart adapted from American Standards Association Bulletin Z 54.1—1946 "Safety Code for the Industrial Use of X-Rays" to show weights per square foot and thicknesses in inches of commercial lead sheets corresponding to metric dimensions indicated on the original chart.

MATERIALS AND METHODS OF X-RAY PROTECTION
By George Singer, Acting Chief Radiation Section, National Bureau of Standards, Washington, D. C., and George C. Lawrence, Ph.D., National Research Council of Canada
A discussion of the materials suitable for use in shielding X-ray installations. Reprinted from *Industrial Radiography* Vol. IV, No. 2, Fall, 1945.

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