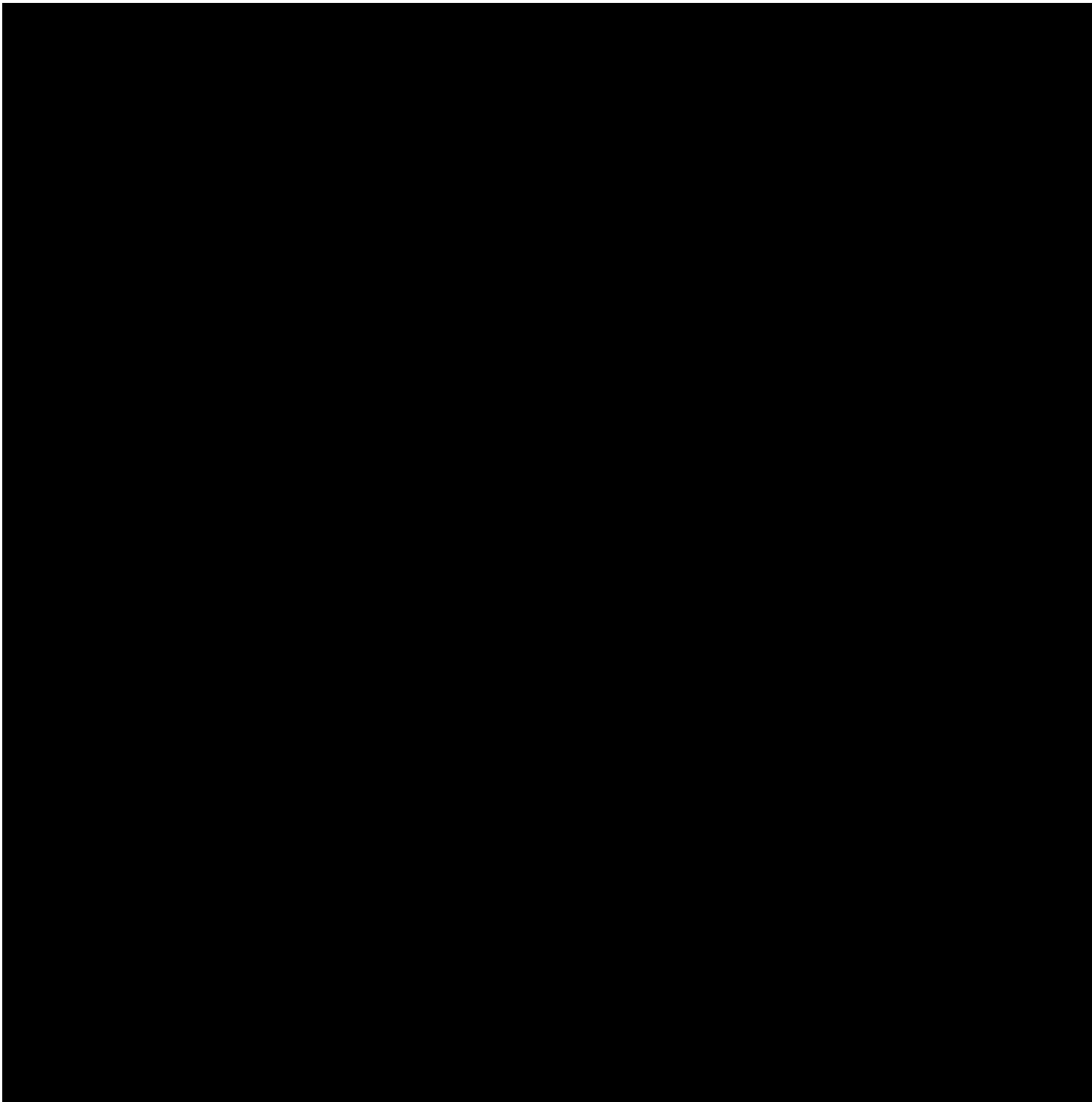


Batteries Provide Dependable Power For Coast To Coast TV Transmission

COAST to coast television transmission is another of the major achievements of the American Telephone and Telegraph Company in its continuous pursuit of better telephone communication. Two of the developments that have come out of this research have made this possible. The coaxial cable and more recently the microwave radio relay system which, working in combination, make it possible for you, sitting in your living room, to view historical happenings or in your lighter moments to be in a position to disagree with the umpire in a close play at the plate though the action is taking place hundreds of miles away.

Both the coaxial cable and the radio-relay developments point up a very important but little realized fact that one of the oldest metals known to mankind, lead, continues to be one of the most useful.

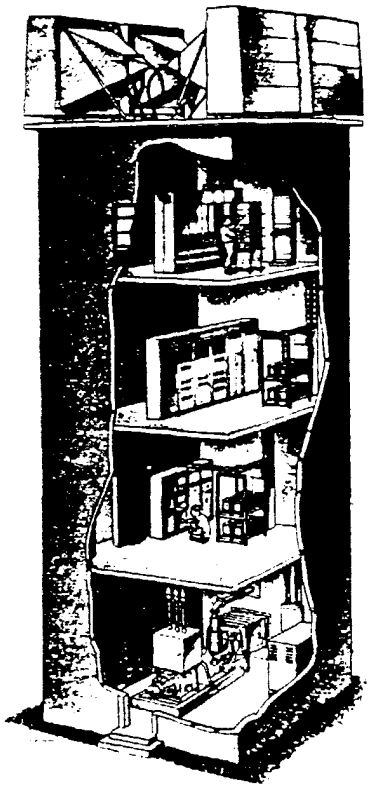
The coaxial cable, for physical transmission of telephone and television circuits, is effectively protected against weather and corrosive acids and salts present in most soils by the impervious lead sheath which completely encases the transmitting wires.

The radio-relay system, on the other hand, does not require any physical means of transmission and therefore does not require lead's protection. The transmitting equipment does however require a dependable source of electrical power and for this reason the equipment is operated from lead storage batteries, many of which are "Exide" batteries manufactured by The Electric Storage Battery Co.

Microwaves, the basis for the radio-relay network, are very short radio waves which behave much like light rays in that they travel in straight lines. For coast-to-coast television, a microwave transmitter must therefore "see" the receiver. It is this characteristic that makes it necessary to have 107 radio-relay stations, each within line-of-sight of its two flanking stations.

In the operation of a television network, the electrical signals produced by the camera are sent to a switching station of the Bell System for transmission to TV stations in other parts of the United States. At the switching stations, the signals may be transmitted over a network of coaxial cables or radio-relay stations, whichever are available. During transmission, these signals weaken and when sent by coaxial cable must be strengthened by booster stations located along the cable. When sent by microwave they are beamed from tower to tower and are boosted at each tower 10 millionfold and it is at these points where the lead storage battery is utilized. Because most of these repeater stations are unattended, the reliability of the power supply is of paramount importance.

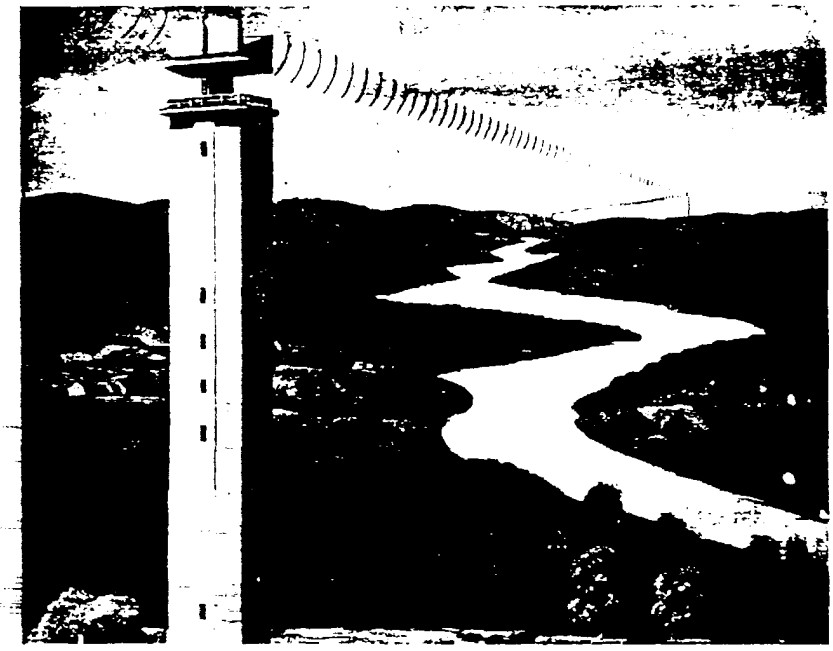
In all cases, commercial power is used to operate rectifiers which supply current for the batteries. In ca-



A cut-away view of a typical radio-relay station. The storage batteries are located on the second and third floors.

The weakened signal is received, strengthened ten-million fold and beamed to the next tower.

PHOTOS BY AMER. TEL. & TEL. CO



Two hundred-foot steel tower near Salt Lake City. Transmitting equipment, including batteries, is located in a separate building.

of failure of the commercial power, the storage batteries continue to supply the necessary power until gasoline operated emergency equipment automatically cuts in and puts the batteries back on float. In the event these emergency generators fail to start, the storage battery equipment is capable of carrying the relay station load for six to eight hours and in some stations 24 hours. A special control system, also operated by dependable lead storage batteries, is used to provide information at control centers concerning the operations of each unattended relay station. At the first sign of trouble, any one of 42 different operating conditions can be checked from the control center and maintenance crews with the proper equipment sent to clear the trouble before any of the viewing public realizes a breakdown has occurred.

One other important aspect of the coaxial cable and the radio-relay systems is that they are capable of transmitting hundreds of telephone messages and television network programs, all simultaneously and all properly unscrambled at the distant end by Bell's System's special equipment.

Wrinkle Removing—An Unusual Use For Lead

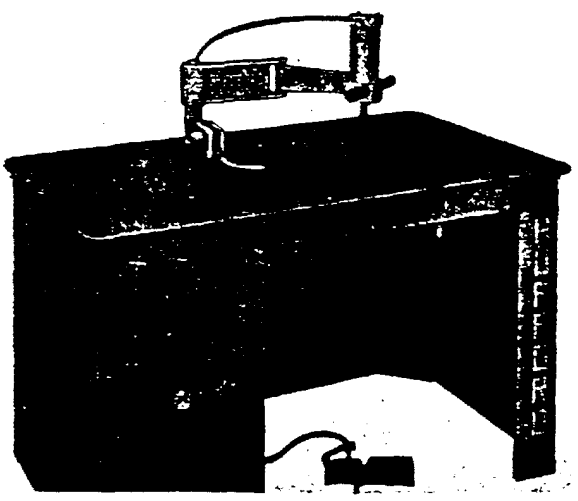
LEAD is a wrinkle remover. In forming sheet metal parts, particularly those used in aircraft manufacture, a serious problem that has always consumed valuable time and labor is the removal of wrinkles from the edges of pressed metal parts. Wrinkles commonly occur when a sheet metal edge is turned and the metal placed in compression. Heretofore, wrinkles have been removed by a fatiguing manual operation. But now a new machine known as a shrink finishing machine, developed by the Hufford Machine Works, Inc., at Redondo Beach, California, not only speeds up the finishing operation but permits the use of female help on an otherwise strenuous job usually restricted to male labor.

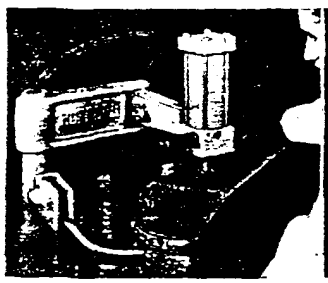
The shrink finishing machine employs a mechanically driven lead "slapper" to do the work. A foot pedal controls a pneumatic clamp to hold down the part to be finished. Further depression of the pedal actuates an arm fitted with a strip of soft lead causing it to strike a series of blows along the wrinkled edge of the piece as shown in the illustration. The forming die remains in the work piece during the slapping operation, serving as an inner anvil. After the first few blows, the slapper conforms over its entire length to the shape of the work. By restricting the sheet metal flow to the area covered by the slapper and compressing the metal to occupy less surface area, the wrinkles disappear.

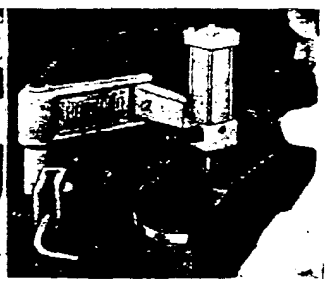
The strip of lead used in the machine is cast, soft lead approximately ¾ inch by 1 inch by 15 inches and weighing almost 5 pounds. The service life of a hammer depends, of course, upon use, but normally 20 hammers or slappers are "consumed" per day. After a slapper has served its useful life, it is simply melted down and recast.

The reason for using lead is obvious: Lead is heavy and dense, yet soft. Its high density makes for ease in hammering and its relative softness causes it to conform to the curvature of the work without damaging or marring it. Furthermore, lead is easily recast with practically no dross loss and no change in its properties.

The Hufford machine for removing wrinkles from the edges of pressed metal parts.







LIA26005

Red Lead Paint Primers Used At Tetraethyl Lead Plant

THE painting of chemical plants and chemical process equipment poses an unusually severe problem for the plant manager and maintenance engineer.

In addition to resistance to mechanical abrasion and the usual natural elements, protective paint systems for chemical process equipment must withstand intermittent or continuous exposure to a variety of chemical fumes. Among the fumes most often encountered are sulfur dioxide, sulfur trioxide, hydrogen sulfide, nitric oxides, chlorine, hydrogen chloride and ammonia.

Since normal plant maintenance procedures oftentimes do not permit the complete removal of corrosion products and foreign matter by sandblasting, suitable paint systems must be designed to adhere to partially rusted surfaces. A good bond to the metal surface requires that the primer vehicle penetrate through the residual rust and foreign matter to establish a firm anchorage to the underlying metal. High molecular weight polymers, such as the chemically resistant vinyl resins, do not have this property.

Excellent bonding to surfaces prepared by wire brushing and chipping can be obtained with red lead primers containing linseed oil base or high oil content alkyd base vehicles. However since vehicles of this type have relatively poor chemical resistance they must be followed by impermeable films of chemically resistant coatings. Pigmented vinyl chloride-acetate copolymer films are exceptionally well adapted for this purpose.

Unfortunately vinyls have two serious handicaps. Their adherence to metal is not good unless the surface can be sandblasted and the strong solvents used in their formulation tend to "lift" and destroy the primers that do offer the requisite surface wetting properties on hand-cleaned steel.

Faced with the problem of developing efficient paint systems for various pieces of steel equipment in the Ethyl Corporation's tetraethyl lead plant at Baton Rouge, Louisiana, Mr. Clarence C. Harvey, corrosion engineer, developed a novel system that has proven highly successful over a five-year test period both on panel exposure and on actual plant equipment. This system is now well known in the Gulf Coast area as the "Harvey System" and consists of a red lead alkyd base primer and a vinyl finish coat separated by a coat of a chlorinated rubber-base product. The chlorinated rubber barrier coat prevents the aromatic solvents and ketones from "lifting" the alkyd vehicle in the red lead primer coat. This system is resistant to both acid and caustic agents. Some tanks protected with this system in acid areas at the Baton Rouge Plant show no significant failure after five years' exposure.

This sulphuric acid drying tower is protected with a paint system containing a red lead-alkyd primer coat and has withstood severe acid spillage and fume conditions for four and one-half years.

Drum coating is another important application of red lead primers at the Ethyl Corporation. "Ethyl" anti knock fluid drums are primed with a red lead vinyl paint. In the case of new drums this is applied by the drum manufacturer directly over the black steel without sandblasting. Some of the older drums have been sandblasted and coated with the red lead vinyl primer.

The vinyl primer is followed in a few minutes by a conventional alkyd base "color coat." When drums are returned from a customer they are cleaned with hot 10% caustic to remove the color coat. The red lead vinyl primer is not affected by this treatment. A new color coat can then be applied and the drum looks new for each shipment.

Operating plant structures for producing tetraethyl lead are also protected with a red lead anticorrosive-vinyl finish paint system. The system is performing well after three years of rigorous industrial exposure.

PHOTOS BY ETHYL CORP.

Public And Private Housing Use Flexible Lead Plumbing Connections

LEAD in its many forms is being used in today's modern building construction whether it be high or low cost, publicly or privately financed. No matter what the type of construction, one of the major considerations is low maintenance cost, particularly of the plumbing system. An installation that provides for flexible lead connections between the rigid piping and the fixtures is almost certain to attain this objective.

Lead, at the present time, is available in ample quantities to take care of all requirements of the construction industry and there are no restrictions on its use. In addition, sufficient quantities are available to use it in place of materials that may be still in short supply.

A quick glance around the country at various construction sites will indicate that high quality lead roughing-in for plumbing systems in all types of housing construction is widely used, particularly for low-cost housing projects. This type of housing undoubtedly requires the utmost care in the selection of materials to meet the cost restrictions placed on such jobs.

LOUISVILLE, KENTUCKY

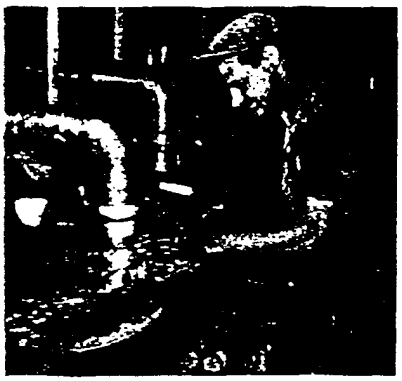
In this land of the blue grass, a modern housing project is now under construction by the Louisville Municipal Housing Commission and when completed will house 650 families in 55 buildings. F. J. Hartsten and O. P. Wood of Louisville, the architects, have used lead extensively on this low-cost housing project.

All bathtub connections are 1½-in. lead "P" traps and 1¼-in. lead "P" traps will take the waste from the lavatories. The water closets are connected to the stacks with 4-in. flexible lead bends and 220 laundry trays waste into 2-in. lead traps. All vent stacks through the roofs are flashed with lead and all joints in cast-iron pipe are lead calked. The plumbing contractor is James E. Smith, Inc., also of Louisville.

ORANGE, TEXAS

Going on to the southwest, we find lead plumbing goods used extensively in a low-rent project now under construction by the Housing Authority of the City of Orange, Texas, near the Gulf of Mexico. On this 100-unit project, lead bends, lead drum traps, lead wastes and vents are being used to make all fixture connections to the soil, waste and vent lines. Lead vent stack flashings are also being installed.

The Shivers Plumbing and Supply Co. of Houston, has set up a plumbing shop on the construction site in which all of the lead work is being prepared in advance of need by one plumber, under ideal working conditions, an arrangement that undoubtedly adds to the quality of the work efficiency. Similar conditions were encountered on all of the other jobs described.



Preparing lead water closet connection for installation in one of the bathrooms of the Louisville, Ky. housing project.

WYNNEWOOD, PA.

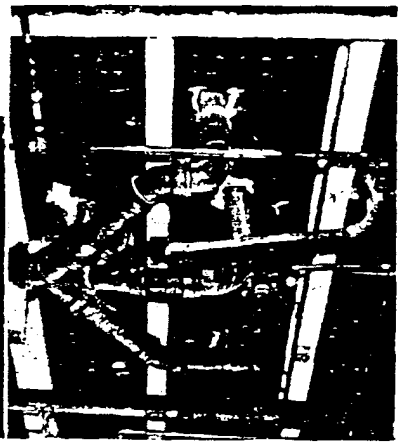
Moving north again close to the city of Brotherly Love, the Benjamin Lessner Co., plumbing contractors of Philadelphia, are following the architect's directions by installing lead wastes and lead water closet stubs in a large privately financed apartment project in Wynnewood, Lower Merion Township.

Lead wastes and lead fixture connections are particularly adaptable to concrete slab construction, the type of construction used in this job, because of the ease with which lead can be made to conform to slight inaccuracies in locating fixtures.

DALLAS, TEXAS

In this rapidly growing city of the southwest, another low-cost Government housing project is underway. The project which is an addition to

Below, some of the lead fixture connections, wastes and vents, installed in a low-rent project in Orange, Texas, and right, the lead and cast-iron roughing-in for back-to-back bathrooms in the project at Wynnewood, Pa.



the already constructed Frazier Courts homes, will contain 300 units. The architects for these additional units have taken advantage of the unique properties of lead when used in the plumbing system, its flexibility, its smooth inner bore, its greater strength at the joints and of course its resistance to corrosion by hydrogen sulphide and other corrosive gases and liquids present in the plumbing system.

The Alford Plumbing & Heating Co. has the plumbing contract for the job and in accordance with the plans is using lead extensively in the waste and vent roughing-in for the 300 bathrooms being installed. Flexible lead bends will connect the water closets to the stack and lead drum traps with lead inlet and outlet arms for all bathtubs are being installed. All vent stacks through the roof will be flashed with 4-lb. sheet lead.

The lead connections in two of the 300 bathrooms in a Dallas, Texas, low-cost housing project.

Unique Acid Mist Precipitator Uses Bonded Lead

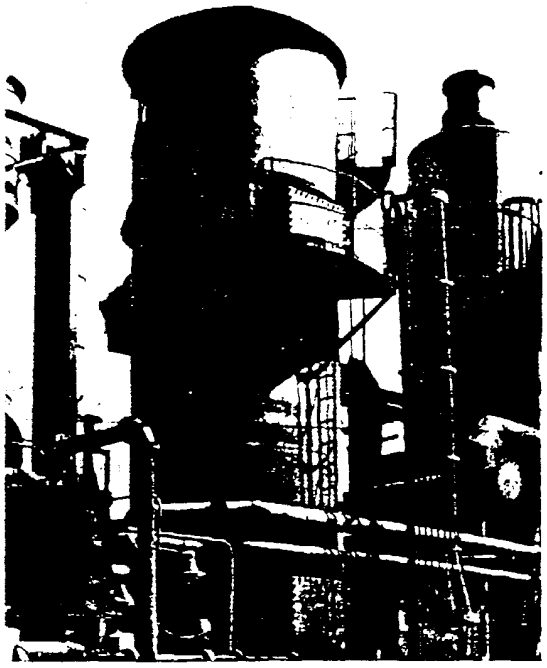
REMOVING sulphuric acid mist from sulphur dioxide gases entering a contact acid plant is a problem faced by many manufacturers of sulphuric acid. The problem has been solved in one instance by means of a "Koppers-Elex" electrostatic precipitator which treats gases containing approximately 10 percent sulphur dioxide saturated with water vapor at 110° F. Installed at the Koppers Gas and Coke Division Plant at Kearny, New Jersey, the mist precipitator was designed to remove from 98 to 99 percent of the acid mist and performance tests have revealed even higher efficiencies.

Another requirement of equal importance to collecting efficiency was that the precipitator be capable of remaining in uninterrupted operation for long periods of time. A breakdown of the precipitator or an appreciable reduction in its operating efficiency would cause serious damage to the plant equipment further along in the process. To prevent such damage the precipitator was designed with lead protection on all interior portions exposed to the gas and to the precipitate.

The precipitator itself consists of a cylindrical shell approximately 10 feet in diameter and 25 feet high. The middle 10 foot section of the precipitator contains the actual precipitation zone while the lower section forms a collection zone where the precipitate is drained off through a hydrostatic seal. The portion of the precipitator above the electrostatic area is devoted to a structural system for supporting its energized members.

The precipitator section is divided into several vertical gas lanes formed by a number of flat parallel lead plates which constitute the collecting electrodes. Hanging along the center line of each gas lane is a row of energized lead wires, spaced equally, whose cross section is that of a five-pointed star. The wires are the discharge electrodes and are hung from a spider framework overhead.

In operation, the contaminated gas enters the bottom portion of the precipitator, is distributed equally among the gas lanes and flows vertically upward through the field where the mist particles are ionized and carried by electrostatic attraction to the collecting electrodes. After its exit the cleaned gas escapes through a main connected to the top portion of the precipitator. The bottom of the precipitator shell is a dished head whose interior surface was bonded with ¼ inch of chemical lead. After bonding, a center hole was cut and a bonded



A bonded lead lined electrostatic precipitator for removing sulphuric acid mist from sulphur dioxide gases entering a sulphuric acid contact plant.

lead lined seal pipe welded in place. A drain line of lead pipe about 4 inches in diameter conveys the precipitated effluent by gravity from the bottom precipitator seal to the sewer. The center section of the precipitator was bonded with lead as well as the top head of the unit whose shape is similar to that of the bottom. The electrode wires were drawn from lead stock containing a center core of mild steel. About 19 tons of lead were used in the construction of the precipitator.

This unit has been in service successfully since 1947.

There are many varieties of sulphuric acid mist precipitators or collectors, among them being the electrostatic precipitator, Pease-Anthony Venturi scrubber, sonic collector, and coke boxes. Invariably such equipment performing so important a function in air pollution prevention and acid recovery is guarded against corrosion by using the ancient metal lead, as a modern material of construction.

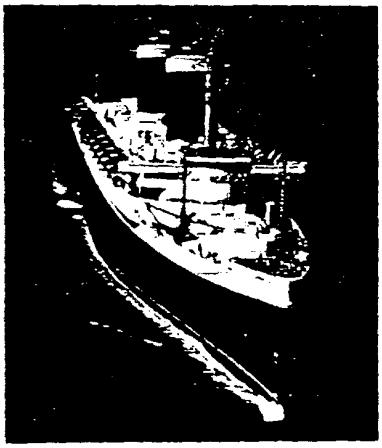
Storage Batteries Supply Stand-By Power For S. S. United States

SPEED king of the seas, the giant ocean liner "United States," flagship of the United States Lines, is equipped with every known device for safety and dependable service including emergency standby lead-acid storage batteries.

Whenever emergencies arise at sea, the first concern of the ship's officers is to avert panic, which often does more damage than the actual incident. Chief among the elements that touch off panic is the failure of lighting. Always ready to work instantly and automatically, the storage batteries stand by to cover all emergencies of power failures, assuring light at all times for this great ship.

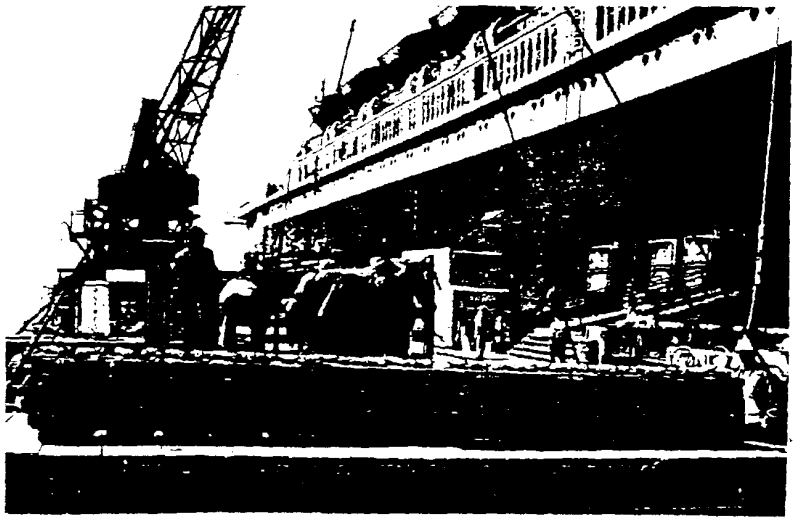
Built by the Newport News Shipbuilding and Dry Dock Company, other important safety measures have been included in the designing and engineering of the S.S. "United States." Although the ship is of fire-proof construction throughout, even to the furniture, passengers bring aboard inflammable materials in the form of clothing, reading matter, and other personal effects. The designers, Gibbs and Cox of New York, have included the latest developments in electrically operated fire doors and compartment closures to isolate any portion of the ship threatened by fire.

During normal conditions, much depends upon the generators that produce electrical energy for the ship. In the event of a breakdown or other emergencies, lead-acid storage batteries take over at once. They provide light for the passengers and crew, and stand ready as an instantaneous source of power for other safety functions.



The record breaking S.S. United States leaving port.

Lead-acid batteries being placed aboard the S.S. United States which will provide power for electrical emergencies.



To guard against acid spillage, which is always an eventuality in a ship traveling the high seas, all battery compartments on the S.S. "United States" are lined with sheet lead. As a further safeguard against the sulphuric acid electrolyte in storage batteries, a chemical which is exceedingly corrosive to steel, most of the shelves supporting the battery compartments are also covered with sheet lead. Actually, this is a customary application for lead since wherever sulphuric acid is encountered, whether as an industrial chemical or, as in this case, battery electrolyte, lead is specified to provide corrosion resistance because it is virtually unattacked; it retains its physical characteristics and does not evolve gases which may be explosive or toxic.

New Lead Book Now Available

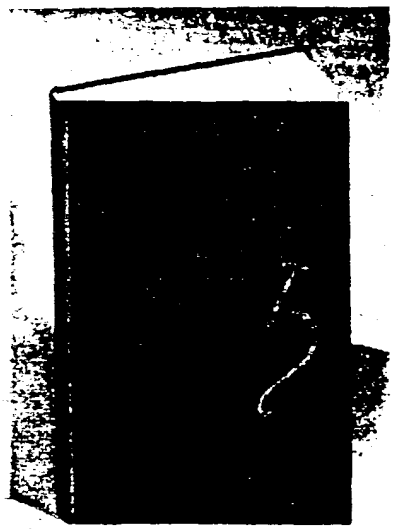
"LEAD in Modern Industry" is the title of a new, fully illustrated, 230 page, cloth bound book that has just been published by the Lead Industries Association. This is the only book currently available whose subject matter is devoted exclusively to the manufacture, applications and properties of lead, lead alloys and lead compounds. It was written to provide the public in general with a broad picture of the whole lead industry and, at the same time, serve as a handy reference source for those who are already using lead and its products. It is sufficiently technical to be of practical value to the engineer in industry and yet broad enough for those with a more casual interest.

The book is divided into twenty-eight chapters beginning with the history of lead, its production from mine to refined metal, and a detailed description of the various techniques for fabricating the metal into useful form. Separate chapters are devoted to the more important uses for lead including storage batteries, cable sheathing, chemical construction, plumbing, architecture, radiation protection, coatings, solders, bearing metals, ammunition, and so on. The corrosion resistance of lead and its alloys and methods of using them for chemical construction are fully detailed along with the techniques for joining lead by soldering or welding. Some operations are illustrated with both drawings and photographs.

The balance of the book is devoted to the manufacture, applications and properties of industrial lead compounds. White lead paints and metal protective paints are covered in detail.

Rounding out the book are the latest specifications for lead, lead alloys and lead products as well as the properties of lead, lead alloys and lead compounds.

"Lead in Modern Industry" may be obtained for $1.50 per copy, postpaid, by writing to the Lead Industries Association, 420 Lexington Ave., New York 17, N. Y.



THE DEPENDABILITY OF FUTURE LEAD SUPPLIES

To help users of lead and lead products, the Lead Industries Association has prepared a leaflet which in a few brief pages tells why consumers in this country may depend on adequate supplies of lead in the future and explains the reasons for last year's temporary and artificial shortage. The booklet answers with reassuring facts and pictorial charts based on these facts some of the misleading or misunderstood statements made about our lead supplies and reserves in recent years. The excess of supplies of lead over industrial consumption is graphically shown.

Copies of this leaflet, singly or in quantity, may be obtained free of charge from Lead Industries Association, 420 Lexington Ave., New York 17, N. Y.

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.

THE USE OF LEAD IN THE PULP AND PAPER INDUSTRY

Detailed description of various applications of lead in the modern pulp and paper mill. Covers all phases of paper pulp manufacture and treatment including sulphite acid manufacture, acid puiping, bleaching and stock handling.
Reprinted from "Paper Trade Journal," Oct. 26, 1950.

LEAD IN MODERN PLUMBING— WHY, WHERE, HOW IT IS USED

A 24 page booklet containing descriptive information as well as four pages of detailed drawings for plumbing installations in various type houses.

METAL PROTECTIVE RED LEAD PAINTS

The versatility of red lead in protective primers to meet a wide range of surface conditions, drying schedules and economic demands is described.
Reprinted from "Paint and Varnish Production," January, 1951.

AN INVESTIGATION OF PRIMERS FOR MARINE ATMOSPHERIC ENVIRONMENTS

Results of an investigation of synthetic vehicles and red lead mixed pigment primers over an exposure period of three and one-half years in a rigorous marine atmosphere. Reprinted from "Official Digest" published by The Federation of Paint and Varnish Production Clubs.

RED LEAD TECHNICAL LETTERS

A series of technical letters issued by the Red Lead Division, Lead Industries Association. The numbers and titles follow: (Available separately)

- Technical Letter No. 3—Red Lead Primers for Atmospheric Exposure
- Technical Letter No. 4—Red Lead Paints for Marine Exposures
- Technical Letter No. 5—Red Lead-Vinyl and Coumarone Type Paints
- Technical Letter No. 6—Red Lead Paint Formulations
- Technical Letter No. 7—Paint Systems for Hydraulic Structures

PHYSICAL AND CORROSION CHARACTERISTICS OF LEAD IN THE CHEMICAL INDUSTRY

A detailed discussion of the use of lead in the chemical industry presented before the National Association of Corrosion Engineers Conference, April 11-14, 1949

NEW DEVELOPMENTS EXPAND USE OF LEAD CONSTRUCTION

Improvements in lead fabrication and installation methods are described and illustrated in a reprint from "Materials & Methods" May, 1951. The article shows how lead construction developments have continued to keep pace with developments in the chemical and process industries.

CORROSION FORUM

A series of one page articles on the use of lead as a material of chemical construction in contact with the following chemicals (available separately): Chlorine, Hydrochloric Acid, Hydrofluoric Acid, Industrial Alcohol, Sulphuric Acid, Sodium Chloride, Sulphur Dioxide, Phosphoric Acid, Chromic Acid, Copper Sulphate, Citric Acid.
Reprinted from "Chemical Engineering."

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.

LEAD WELDING

An informative as well as practical guide to lead welding. Reprinted from the "Welding Handbook, Third Edition" published by the American Welding Society.

CONTROLLING CORROSIVE AIR POLLUTANTS

A discussion of the various methods in use today to control corrosive air pollutants. Reprinted from "Air Repair," May, 1952.

LEAD IN MODERN CHEMICAL CONSTRUCTION

What you should know about the various types of lead construction in the chemical field. Reprinted from "Chemical Engineering," Jan. 1952.

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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