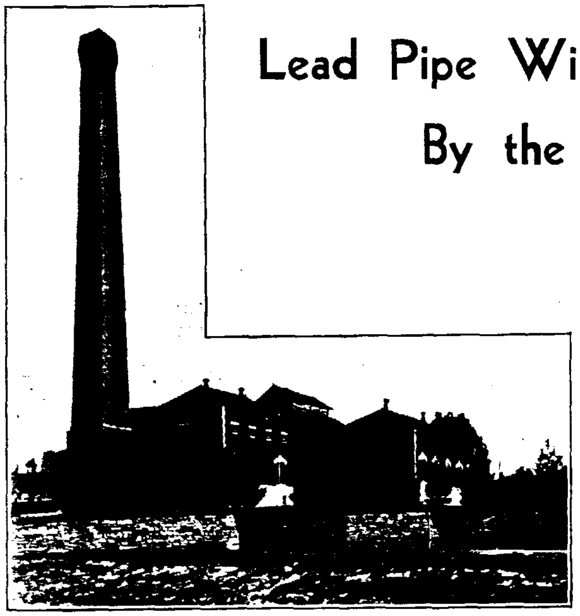
Lead Pipe With Compression Fittings Used By the York Water Company



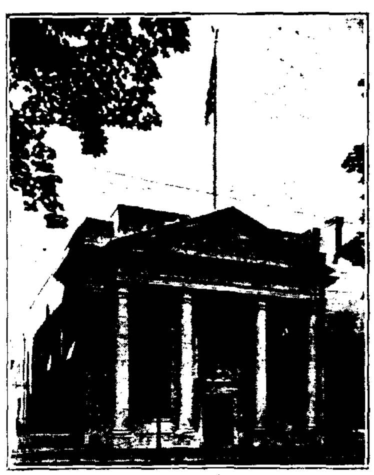
Pumping station of the York Water Company.

THE York Water Company of York, Pa., has installed during the last eight years about 200,000 feet of lead pipe for water services. A rough estimate would place this as amounting to about 15,000 connections. York has always depended upon lead to furnish the best material for the soil conditions locally present and the nature of the water handled. Many lead services have been in use over 50 years, giving clear, undiscolored, healthful water to the local homes and business establishments in this community of about 80,000 people.

An interesting feature of the York Water Company's practice is the almost exclusive use of a compression type of brass coupling for connecting its lead pipe to corporation cocks or other devices necessary in the line rather than the use of wiped joints, the commonest procedure. The union unassembled is shown in an accompanying photograph from which its simplicity will be readily appreciated. All that is necessary is for the plumber to insert the lead service in the union and with a simple tool swage out the lead to fit over the face of the union sleeve, and then trim it to fit. A knurled face makes certain that the union will have a tight grip on the lead. The joint is very quickly put together, and the refinement of a set screw makes sure that the union will not come loose through vibration. A series of photographs illustrate the simplicity of the entire operation. Mr. Edgar P. Kable, General Manager of the York Water Company, has used this type of joint for about eight years with every satisfaction and it is now standard practice with his company.

Incidentally, the York Water Company, in doing everything in the finest manner possible has an unusually handsome office on East Market Street, with

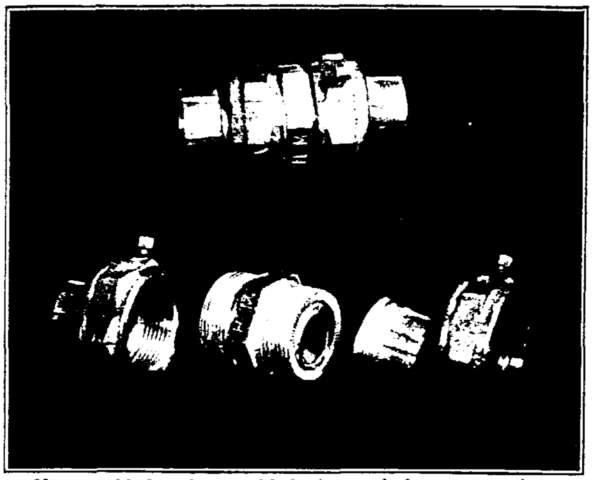
Stately interior of the York Water Company's offices.



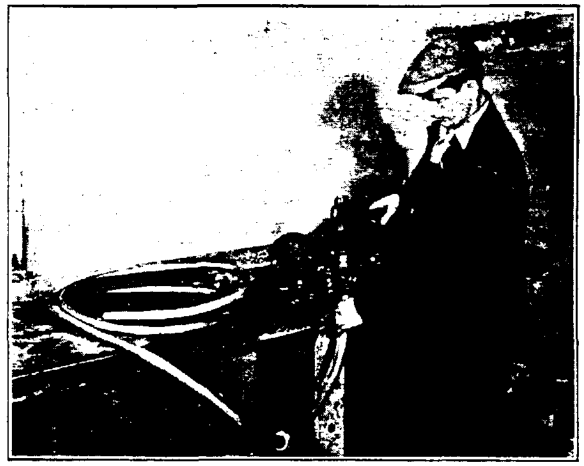
Handsome marble façade of the York Water Company's office building.

a beautiful marble exterior and an attractive interior which resembles a bank more than it does the headquarters of a progressive water company. York is but another city which has had a long and happy experience with lead.

Lead pipe for water services furnishes a combination of advantages which no other metal possesses. Besides the extraordinary durability and ease of working lead pipe, is the extremely important advantage it has of adequate wall thickness to resist soil corrosion. The wall of a lead



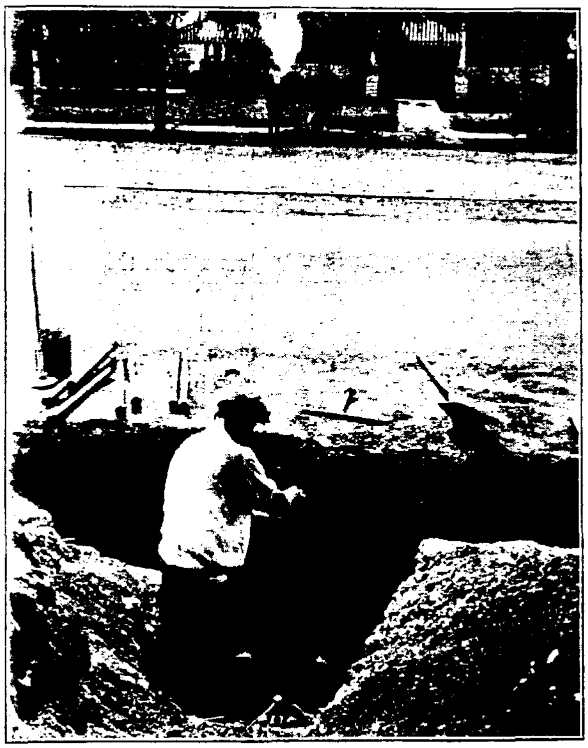
Unassembled and assembled views of the compression coupling used by the York Water Company. Note the knurled face of the threaded center piece.



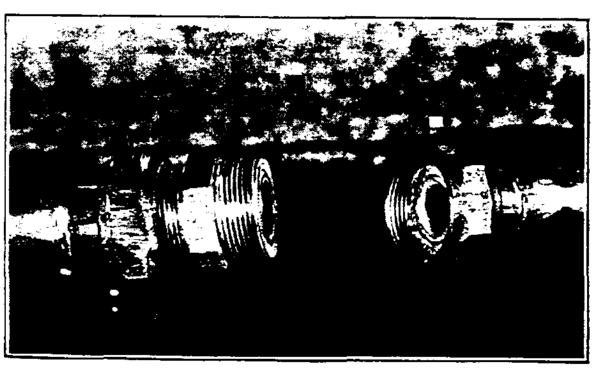
Swaging lead pipe in the shop. A few simple tools are all that is necessary and the entire operation consumes only a few minutes.

service pipe is about four times as thick as tubing used for the same purpose. In fact, lead pipe furnishes the greatest wall thickness of any commercial pipe material in use for water services today and therefore gives the user correspondingly greater assurance against perforation from soil corrosion and consequent expensive renewals, often involving the costly ripping of pavements and lawns in order to reach the line.

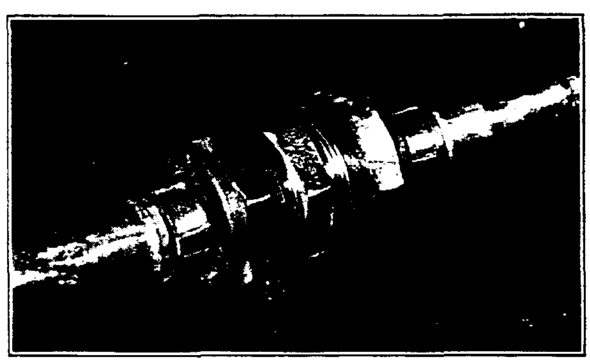
As illustrated in one of the accompanying photographs, the great flexibility of lead pipe is another distinct advantage with a dollar and cents value. With comparatively small openings in the surface of the ground great lengths of pipe may be pulled through into place without disturbing overlying pavements. This feature also eliminates many joints, and the pipe can readily conform to ground subsidence as well.



Pulling a 64-foot length of lead pipe under the Lincoln Highway at York, Pa., without disturbing the surfacing.



Compression fitting ready to be joined, showing the face of the lead pipe.



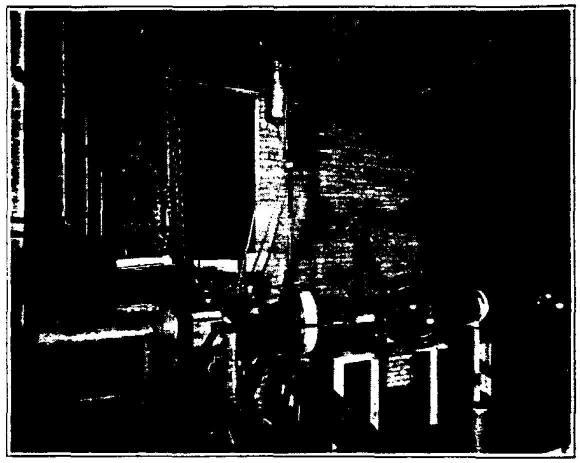
Compression coupling attached to a lead line. Note the set screws.

Two-Inch Lead Wall Protects Against Strongest X-Rays

A NOTEWORTHY contribution to the study of the treatment of cancer is the recent installation of a 900,000-volt X-ray tube at the Memorial Hospital, New York, the most powerful of its type ever constructed for continuous operation. This hospital, which has long been famous for its progressive study of this malignant disease, has in its possession large amounts of radium and radium emanation which have been used in the treatment and study of cancer. Now, through the cooperation of the General Electric Company, who built and have been experimenting with this tube under the direction of Dr. Coolidge, the Memorial Hospital has installed this extremely powerful machine and made provisions for experimental treatment of patients and other experimental work on X-rays.

The tube has already been operated at 700,000 volts and 4 milliamperes for more than an hour, and has reached as high as 850,000 volts. After it has been thoroughly broken in it will be operated at its full voltage. Tubes capable of operating at higher voltages can be run only for a fraction of a second at a time.

The powerful rays from this machine must be rigidly controlled, for they are very harmful if received where they are not wanted. Therefore suitable protection must be provided, and as lead is the most efficient practicable substance for absorbing X-rays, the room into which the rays are projected, and in which patients will lie when treated, is completely lined with unusually thick sheets of lead.



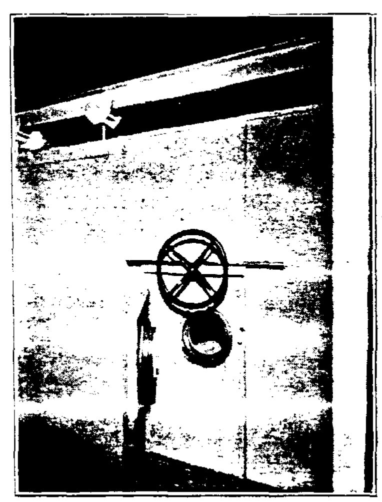
The 900,000-volt X-ray tube at Memorial Hospital, New York. The thickness of the lead sleeve at the target is visible on the raised removable section.

The rays are projected horizontally from a tube leading through a hole in one wall. This opening has a 4-in. thick lead sleeve surrounding the "target" where the rays are produced, to prevent their escape in all directions. The room is 5 ft. x 10 ft. x 6½ ft. On the wall directly opposite the aperture through which the rays enter, the lead lining is 2 in. thick. This wall receives the direct rays from the tube. Steel plates are bolted to upright steel angles and

Interior of the lead-lined room, showing the bench on which patients recline. The box-like affair on the wall is where the rays enter.

On the right of the picture is the 2-in. lead wall which stops the direct radiation. Note how the lead sheets are bent inward at the top to provide more overlap.

Opening in lead wall, opposite the tube, through which the rays are measured. Note thickness of lead on the opening, and suspension of the sliding lead-lined door.



the sheets of lead fastened to the plates. The lead wall is built up of four layers of ½-in. sheets, staggered so that at joints there will be at least 1½ in. of lead to penetrate. Bolts holding the lead to the steel are as few as possible and placed as far as permissible from the point where the direct rays hit the wall. Thus, because the lead is 2 in. thick, even though some bolts completely pierce the lead, the X-rays are traveling at an angle to the wall where bolts are located and cannot pass through the holes. The rest of the room, other walls, ceiling and floor, which receive only indirect radiation, are lined with 1 in. of lead built up of staggered ½-in. sheets. Additional support against sagging is given the 2-in. lead wall by iron straps running the height of the wall and fastened at top and bottom.

A sliding door covered with 1 in. of lead permits access to the room, and a lead-glass window with a lead panel to cover it, except when the operator is looking through it, permits the man at the controls outside the room to view the patient within. The lead sheets on the walls, sawed to the proper sizes, are placed with their short dimension vertical to insure close contact at the long edges. The top sheets curve slightly inward so that they overlap the lead ceiling by a greater amount than just the thickness of the lead walls. Floor sheets extend under the wall sheets whereas the ceiling is constructed of sheet steel overlain with lead.

The complete installation is in a separate building from the rest of the hospital on account of the 20-ft. ceiling height required for the high voltage generation. In one of the outside walls, where no other building is close, is an unprotected window. Only a small amount of indirect radiation can escape through this window. The tube itself is in another room and is spaced at least 7 ft. from the nearest wall to prevent sparking at the tremendously high voltages used.

Lead Paint Protects for 261 Years

IN the older parts of the United States there are many landmarks which hearken back to pre-revolutionary days. These landmarks are the ties which bind the modern America of skyscrapers and whirring machines to the early America of our forefathers. It is through them that we gain most of our first-hand knowledge of how our ancestors lived.

Foremost among landmarks are the old colonial dwellings in which the colonists lived. Along the eastern seaboard these homes were generally built of wood, yet many remain in excellent repair after so much as 275 years. Why? Because the wood has been protected from the weather, from the salt air of the sea, and the snow and fog of New England, by paint.

In colonial days and almost up to the start of the twentieth century, there was only one white paint pigment in general use—white lead. It was the base for practically all of the lighter colored paints, the blues, the greens, the tans and the grays. So it is safe to say that most of those old landmarks that are still so well preserved have been protected by white lead paint since they received their first coat.

This house, built in 1670, is in excellent condition, thanks to the great protection of lead paints.

The Swett-Ilsley house at Newbury, Mass., is a typical example. Built by Steven Swett in 1670, and later used as a tavern, it is now owned and preserved by the Society for the Preservation of New England Antiquities. It was last painted seven years ago with white lead paint, the protector that has undoubtedly guarded its wood for so many years.

Pure white lead paint is not only less expensive per gallon than other comparable house paints but, because it lasts longer, is the cheapest on a per year basis. Because it leaves an excellent surface for repainting without removal of the old paint, the labor cost of repainting is also reduced.

Lead Waterproofing Aids Plumbing Remodeler

COURTESY DOMESTIC ENGINEERING

Home in which the bathroom remodeling described here was done.

SHEET lead has been most useful to Mr. J. F. Kuenzli, manager of the Hillcrest Plumbing Co., of Oak Park, Ill., in some of the extensive bathroom remodeling he has done. How he has carried out this work from selling home owners on the idea to completion of the job has been well described in recent issues of *Domestic Engineering*. It is felt that that part of the work in which sheet lead came to his aid, the installation of shower stalls, is of sufficient interest and value to be repeated here and in another article soon to appear in LEAD. The growing popularity of shower stalls among men, women and children alike is a fine entering wedge for the plumbing contractor who desires to sell remodeling ideas, for, from the first idea of installing a shower, entire bathroom jobs often grow.

In the particular job pictured here Mr. Kuenzli developed some new ideas on waterproofing the stall. It is a tiled stall, and his observations in the past had led him to conclude that when the tile leaks anywhere above the floor, the leaks usually occur in the corners. Therefore, after installing a lead pan on the floor in the same way as described in the March, 1931, issue of LEAD, he placed lead shields extending from the ceiling to below and inside the turned up edges of the pan in each corner. These shields are 12 in. wide so that in place they extend 6 in. on each side of the corner. Thus, if water penetrates the tile at the corners, it is deflected down into the floor pan and thence to the weep holes in the drain. The pan on the floor extends 8 in. up each wall and corners are folded rather than cut to insure a leakproof corner. Lead weighing 6 lb. per sq. ft. was used for the pan and 4 lb. lead for the shields. The shields were fastened at the top with copper nails.

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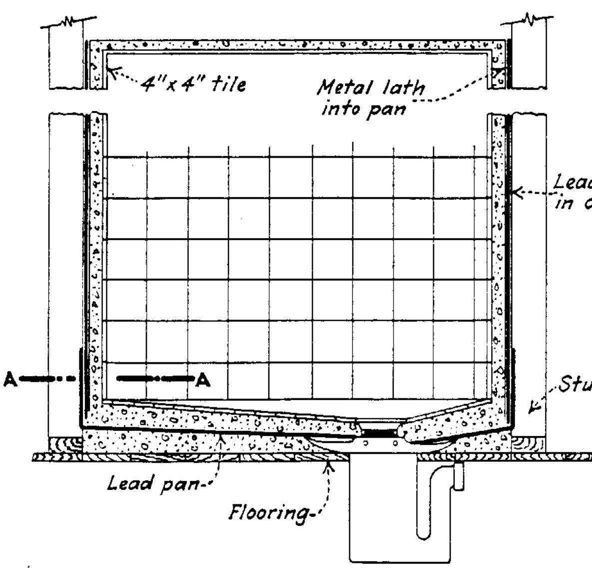
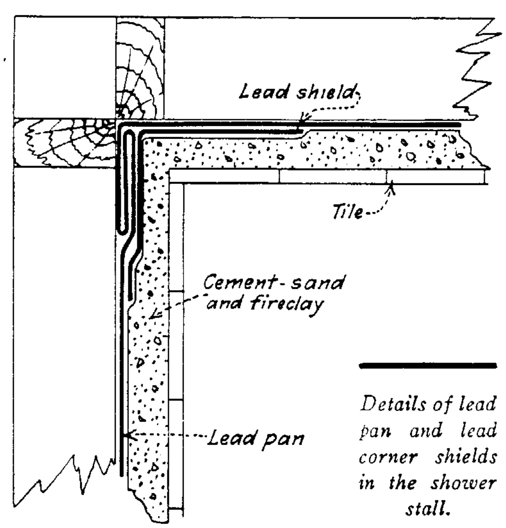
Lead waterproofed shower room installed on this job.

All lead is coated both sides with asphaltic material to prevent any possible corrosion due to free lime in





Details of lead pan and lead corner shields in the shower stall.

Section A-A

the cement coming in contact with it. Metal lath on the walls extends down below and inside the top edges of the lead pan. This method of waterproofing practically eliminates the possibility of a plumbing contractor being held responsible for ceilings below that have been ruined by water, because the waterproofing is the best.

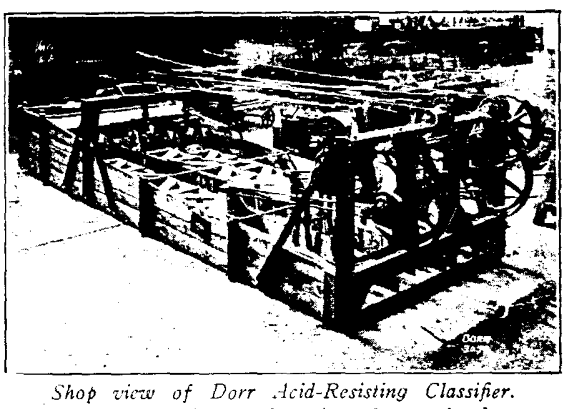
Some city plumbing codes require the use of lead shower pans, but regardless of code requirements it is to the advantage of architects to specify and plumbing contractors to install lead pans as an insurance of a satisfied clientele. Lead is the best material for the purpose, because it is absolutely impervious to moisture, because it forms easily and dresses down evenly, and because, if properly installed, it will last indefinitely.

An Abrasion-Resistant Hard Lead for Chemical Use

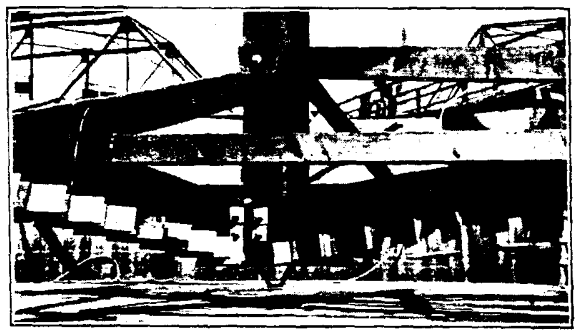
WITHOUT the use of lead, it is safe to say, much of the modern, mechanically operated equipment, used in the chemical industries, would never have been developed to its present state of reliability. Lead-lined tanks and vessels, lead-covered steel mechanisms and lead piping and castings have all played their parts in bringing to the chemical engineer machines and apparatus to withstand the corrosive forces present in so many processing substances, particularly sulfuric acid.

But lead, excellent though it is as an acid-resisting metal, is comparatively soft, even when alloyed with antimony. Lead parts, subject not only to the action of corrosive substances but also to the eroding action of abrasive particles, may wear out at a rapid rate and must frequently be replaced.

An answer to the problem of combined corrosion and erosion is "plumbalun," an abrasive-resisting hard lead developed and manufactured by the American Abrasive Metals Co. and marketed in the wet material handling field by the Dorr Co., Inc. The basis of "Plumbalun" is the application of a layer of abrasive grains over the entire surface of a hard lead casting. The abrasive grain used is known as aloxite and is a synthetically prepared abrasive, consisting chiefly of bauxite, an aluminum silicate ore, fused in an electric furnace.



Shop view of Dorr Acid-Resisting Classifier. Plumbalun blades are fitted into the wood rakes.



Plumbalun blades fitted into wood arms of a Dorr Thickener used in phosphoric acid manufacture.

The mould is lined with a layer of aloxite about one grain in depth before the hard lead is cast. In order to get the best protection and the least commercial amount of voids, the grains are screened so that all pass a 16 mesh standard sieve and are retained upon a 30 mesh sieve. Coarse grains may be used, but the percentage of the total surface protected is somewhat less.

Plumbalun parts outwear ordinary parts several fold. In general, their life is dependent upon the time required for the acid to eat out the lead between grains, causing the abrasive to break away from the bond.

In the chemical and process industries, plumbalun is extensively used for thickener and classifier rakes, for the lips of scoop feeders attached to ball and tube mills, and for the buckets and flights of conveyors handling wet, corrosive substances. The durable, abrasive facing is an approved means of extending the use of lead and its alloys into the erosive field. Consequently, its use should not be overlooked by any engineer who is confronted by the twofold threat of chemical attack and mechanical attrition.

How a Great Railroad Paints Its Water Tanks

PROTECTING the interiors of steel water tanks from rust and corrosion is often a troublesome problem because the paint or other protective material is nearly always under water, and frequent repairs or repainting mean putting a tank temporarily out of service. Therefore the method successfully used by the Union Pacific System should be of interest to all with similar problems.

This 10,000-mile rail system has 260 steel water storage tanks at 230 stations. They vary in capacity from 6000 to 1,000,000 gal. and run up to 100 ft. in diameter at main terminals where maximum daily consumption is 1,400,000 gal. The total storage capacity is 31,300,000 gal. and represents an investment of several million dollars. Probably no railway system encounters a greater variety of climatic and water conditions than the Union Pacific. Its painting jobs are therefore put to severe test and the problem of protecting the large investment is of great importance.

Steel tanks are given a shop coat of ready-mixed red lead paint inside and out. After erection the exterior is given a brown and a black coat, both being mixtures of red lead and lampblack, with lampblack increased in the black coat.

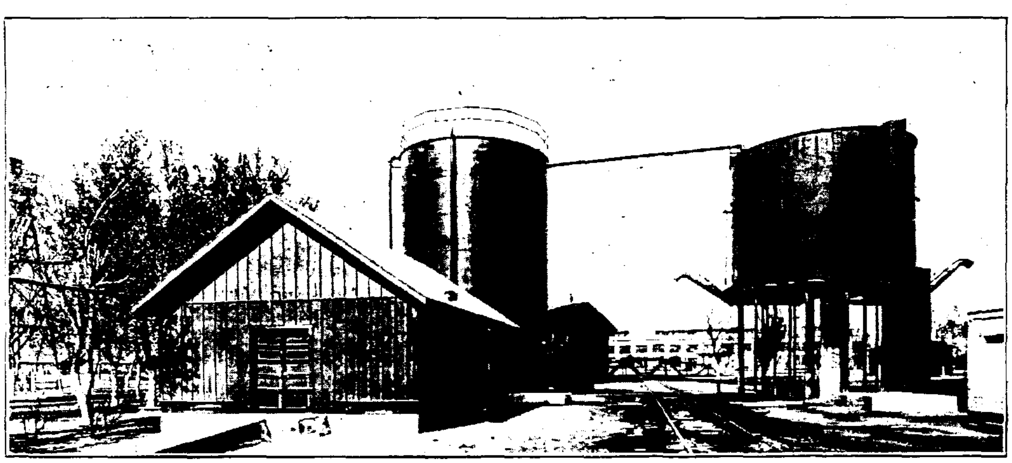
Interiors receive three coats in addition to the shop coat. The first field coat is brown and is made by adding 10 oz. of lampblack paste, 6 fluid oz. of japan drier, and 2 lb. of finely powdered litharge to 1 gal. of ready-mixed red lead paint. A second field coat, light brown, has the same composition as the first with the exception of the lampblack paste, 5 oz. of which are used instead of 10. The third field coat, red, is the same, with all lampblack omitted.

The litharge passes a No. 325 sieve with total residue on the sieve not exceeding 1 per cent by weight. The ready-mixed red lead paint pigment contains 88 per cent of red lead by weight, which must run not less than 94 per cent true red lead. The lampblack paste is 25 per cent pure lampblack by weight, balance pure linseed oil. Addition of the litharge gives an extraordinarily hard paint film that does not become unduly soft by continued soaking. The ready-mixed red lead paint contains 76 per cent by weight of pigment.

Tanks are inspected annually and painted at intervals of from four to ten years, depending upon local conditions. To avoid interruption of water service, a set of three 8000-gal. steel tanks with demountable steel trestle support is conveyed on flat cars to the vicinity of the paint job as a temporary storage plant. The permanent tank is drained and the steel cleaned, sometimes by sandblasting, but more generally by scraping and wire brushes. Brush painting is usually used. The paints described cover about 400 sq. ft. per gal. with the brush method.

Through experience the Union Pacific has learned to watch closely the following vital items:

1. The steel work must be dry and temperature conditions favorable when paint is applied.
2. The paint must be thoroughly mixed at the start and frequently stirred.
3. A rather high proportion of pigment is desirable especially on interior surfaces.
4. Each coat must be brushed out to a thin film.
5. Litharge is to be used in each field coat for interior surfaces.
6. Proper intervals of time must be allowed for the drying of each coat.



Water tank and water softener along the Union Pacific lines painted with red lead.

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The Lead Industries Association invites inquiries on any subject relating to lead and will be glad to cooperate in the solution of your lead problems.