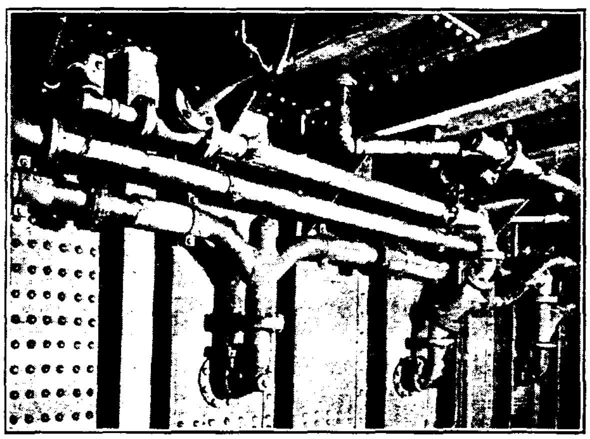
Lead Soil Pipe for Luxurious New Grace Liners

FOUR luxurious ships under construction for the Grace Line are nearing completion at the Federal Shipbuilding and Drydock Company at Kearny, N. J. The first, the "Santa Rosa," will make her maiden voyage from New York November 26th. The four new ships will ply between the Eastern and Western coasts of the United States, via Havana, Colombia, Panama, the West Coast of Central America, and Mexico — calling at seven foreign ports.

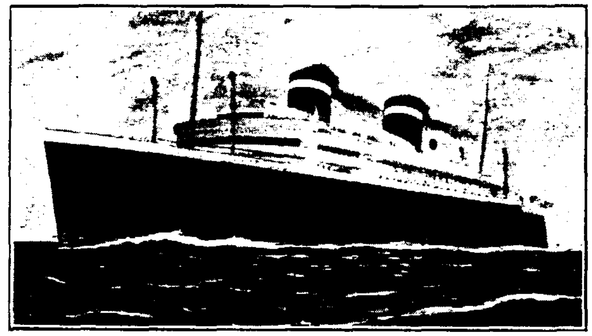
These superliners were built under the provisions of the Jones-White Merchant Marine Act of 1928 at a cost of $20,000,000. In their construction about 320 tons of lead is required, about 200 tons being pipe, 100 tons sheet lead, and 20 tons pig lead. This of course disregards a large amount which will be used in red lead and white lead.

The four ships—alike in every detail—are 508 ft. long, 72 ft. wide, with 17,000 tons displacement, and are capable of developing a speed of 20 knots an hour. They are the first American ships having all outside staterooms with private bath. In addition to their luxurious passenger accommodations, these new and faster ships are equipped with the most modern facilities for the handling and storing of freight.



Lead soil pipe on the Santa Rosa. Note both burned and flanged joints, and sleeve protection at hangers

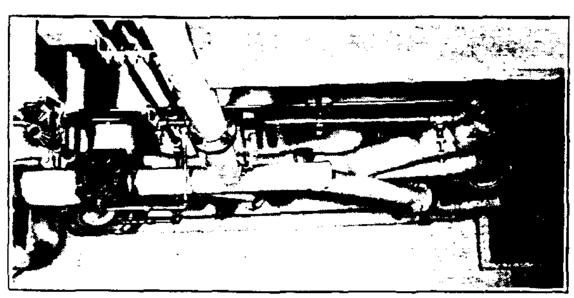
The entire soil pipe system, both stacks and branches, is lead. When one considers the demands put on shipbuilders by travelers these days, each desiring a private bath, one can imagine the vast amount of lead pipe this system requires. A ship, before it is finished so that all a passenger sees has the appearance of the finest hotel, is almost a solid mass of pipes, and these must be concealed in as small a space as possible. Lead pipe was selected for the soil system because it provides as sanitary and durable a system as it is possible to install. This is of particular importance on shipboard where salt water used for flushing adds to the corrosive attacks normally experienced in soil pipe. Salt water is widely and successfully transported in lead pipe. On shipboard pipes rarely run more than a few feet before they encounter obstacles which they must get around, and flexible lead pipe is easily bent around these obstacles without the use of any special fittings, which are both a source of weakness and an obstruction to flow. Flexible lead pipe also takes care of the movement bound to occur in the plumbing system of ships, due to the movement and buffeting of the ship itself.



New Grace Liner Santa Rosa, which will make her maiden voyage from New York, November 26

Where space permits, joints in the lead pipe are flanged. Flanges are burned to the pipe in the shop and are joined by bolting through a washer. However, most of the joints are regular welded joints, which of course require less space than either flanged or wiped joints. In effect they make the piping one long continuous piece of lead pipe which should certainly obviate any joint trouble. The welding is done on the deck before installation wherever possible, but in some cases burning must be done in place, a job requiring very expert lead burners where the joint is overhead or in awkward locations.

Lead pipes are supported at 3 ft. intervals both



Finished lead piping after covering

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horizontally and vertically. Horizontal lines are protected mechanically at the hangers by light steel sleeves about a foot long. Stacks are supported by burning two lugs to the pipe and passing a steel strip between them.

Sheet lead is used to line refrigerator rooms as a moisture proofing material. This has required an unusual amount of sheet lead because refrigerated space is large to handle tropical and perishable produce. Sheet lead is also used as flashing at various points in the joiner work on deck, because of its high resistance to sea air and sea-water corrosion.

Lead Calked Water Mains Have Necessary Flexibility

"The past summer witnessed the greatest number of fractures in our distribution system during the past twenty years and it is a matter of record that not one break occurred in close proximity to a lead caulked joint."

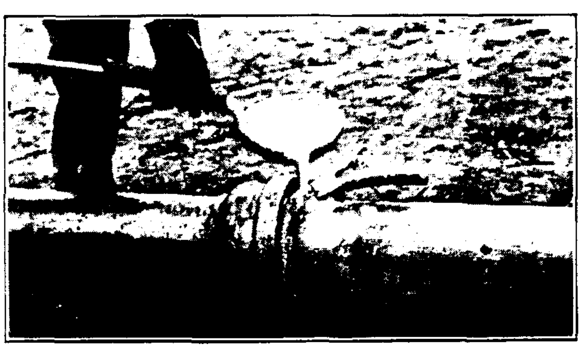
—Journal American Water Works Association, Page 1124, Vol. 24, No. 8, August, 1932.

* * *

THIS statement is a powerful support to the theory that leaded joints actually aid in the preservation of water mains, and do not lead to injury as do rigid substitutes. In the experience of Ottawa, Canada, quoted above, there were twenty pipe fractures adjacent to rigid joints in one summer while, as stated, there were none near lead joints.

The reason for this is that ground shrinkage or settlement (soil stress) places a terrific load on pipe and joints alike if rigid jointing compounds, such as cement or sulphur and sand compounds, are used. Something must give way. If the joint goes, water service must be interrupted while the compound is entirely chipped out and a complete—and costly—new joint made. But the pipe itself is just as likely to fracture under these loads as the joint to fail, if an inflexible jointing material is used, and that means even more expensive repairs.

Lead joints allow the pipe to adjust itself to settlement, because they are flexible and can be deflected considerably without leakage. The pipe is thus relieved of strain and does not fracture. Moreover, should the movement be so great that a leak in the joint occurs, it can be repaired by simple calking without interruption to service. In any event, when lead joints are used the pipe itself is protected.



COURTESY U. S. PIPE AND FOUNDRY CO.

Pouring a lead joint in cast-iron pipe

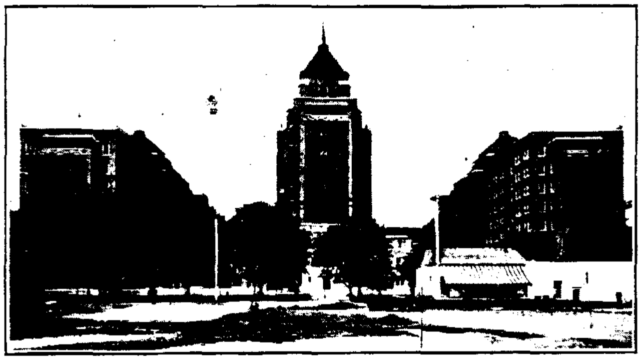
COURTESY U. S. PIPE AND FOUNDRY CO.

Calking a lead joint in cast-iron pipe

Substitutes for lead are attractive because they often represent a saving on first cost, but pipe fractures more than offset this saving because of the high cost of repair, and fractures may also cause great damage to city and private property, and may even endanger human lives. In addition to this protective feature lead has other advantages not enjoyed by substitutes in that pouring temperatures need not be so carefully controlled, repairs to lead joints are simple and made without interruption to service, large pipes do not cause too rapid cooling of lead, and flexible lead joints are less subject to injury than rigid jointing compounds.

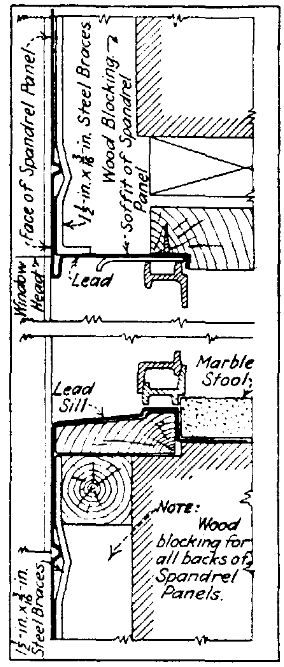
To summarize, modern investigation indicates that water-mains, buried or not, must be built with maximum provision for flexibility so that the pipe line may not only adjust itself readily to temperature changes but also to soil stress. An all-metal installation, such as cast-iron and lead is far superior in flexibility to a cast-iron pipe line using earthy calking material.

Beautiful Architectural Lead Work, Kings County Hospital



PHOTOS BY WURTS BROS.

(Above) Kings County Hospital, Brooklyn, N. Y.
(Left) Corner bay, central tower, showing hard lead spandrels and mullions, roof and finial



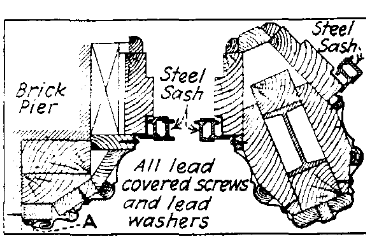
(Fig. 1) Detail of lead work at window heads and sills

KINGS County Hospital, just completed in Brooklyn, N. Y., is among the largest and finest examples of architectural lead work produced in this country. It is worthy of close study by architects and contractors because the building embodies many different applications of lead — a metal that is coming into its own here as it did abroad long ago. Practically all visible sheet metal work is hard lead with the exception of cap flashings, which are 4 lb. soft lead. The many applications include spandrels, mullions, roofing, flashing, marquises, hanging and built-in gutters, downspouts, finials, crestings, cupolas, a spire and louvres.

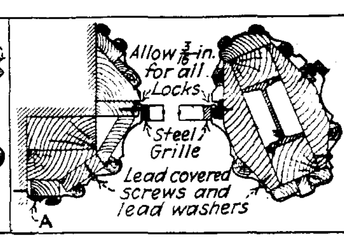
At each end of the building, extending seven floors in height, are flat bays of windows on which 4 lb. hard lead spandrels and mullions appear. The same is true of oriel bays at the front and back of each section of the building and corner bays on the center tower. The spandrels and wide side mullions were ornamentally stamped from rolled hard lead sheet, using zinc dies. Dies were made from plaster patterns. The modeling was done by R. Chambellan, New York.

Strips of hard lead were built into the masonry at each side of the bays and the side mullions folded into them (Figs. 2 [A], 3 [A] and 4 [A]). Mullions are held in place by lead-covered screws passing through them into wood backing. Expansion and contraction are minimized by installing the mullions in 4 ft. lengths. Joints are simply butted and backed with a piece of lead-coated copper soldered only to the lower of the two abutting mullion sections so as not to interfere with free movement.

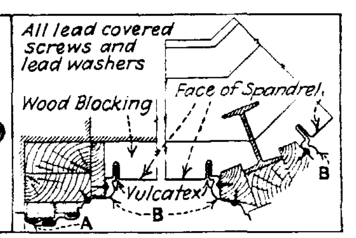
Mullions are let into folds at each side of the spandrels (Fig. 4 [B]). These and all other folded joints are filled with Vulcatex Non-Hardening Compound. Spandrels are backed with heavy steel straps



(Fig. 2). Lead work at sides of windows, showing side and center mullions



(Fig. 3). Lead work where steel grilles replace windows



(Fig. 4). Detail of joints between hard lead spandrels and mullions

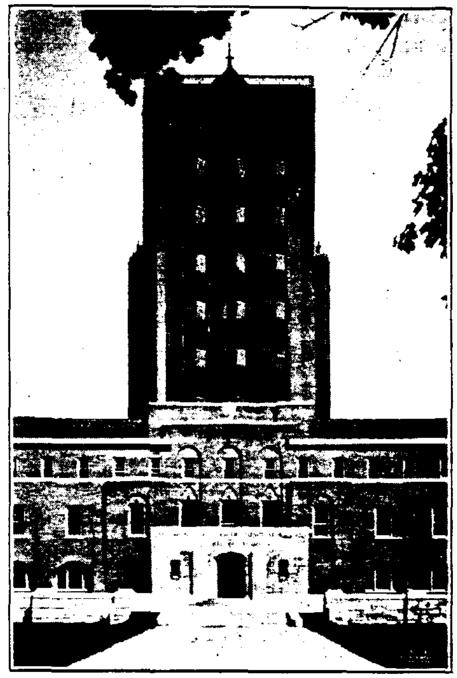
(LEFT)

Oriel bay on one wing, showing hard lead spandrels and mullions and lead-covered corbel

(RIGHT)

Entrance and central tower. Hard lead spandrels and mullions are visible on both oriel and corner bays. Also a lead spirelet is just visible at the top

PHOTOS BY WURTS BROS.



about 4 in. from each side and bent over at the top to hook into the masonry. Stiffening is provided by a section of 2 by 4 fastened to the masonry in back of the center of each spandrel and the spandrels secured to the 2 by 4 by means of lead-coated screws. At the sills the spandrels are turned back and calked into reglets with lead wool. They are also turned in over the window heads.

In certain places these bay windows are replaced by steel grilles, making open porches. In such installations the center mullions are completely covered with hard lead inside and out and the lead on the side mullions passes around inside until it meets the masonry (Fig. 3).

The architects were Le Roy P. Ward, Inc.; the sheet metal contractor Sobel & Kraus, Inc., both of New York; and the ornamental stamping was done by Wm. J. Kelly of Brooklyn, N. Y.

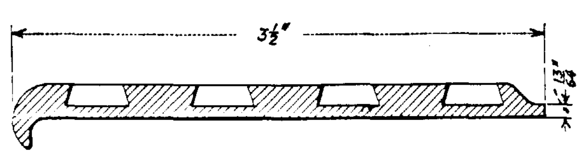
(TO BE CONTINUED)

Lead-Filled Stair Treads Used by U. S. Navy

LEAD-FILLED, brass base stair treads and deck plates are used by the U. S. Navy Department on battle-ships, cruisers and other types of vessels. Similar treads, some composed entirely of lead and others a combination of lead and other metals, are widely used in buildings and public conveyances. Lead provides a surface that prevents slipping and yet has enough give to be easy on the feet. It is a natural resistant and as a stair-tread offers a firm and not too sudden contact. In the case of the Navy lead also has the valuable characteristic of being highly resistant to corrosion by sea air and salt water which rapidly attack some other metals. In fact lead is a preferred metal for conveying salt water and for many other applications where this corrosive is concerned. It is the most durable common metal for the purpose.

Treads composed solely of lead, such as those used by Public Service Coordinated Transport of New Jersey (described in LEAD, March, 1931), have the advantage that they can easily be remelted, recast and used again after they have become worn, thus making probably the most economical type of safety tread available.

American Abrasive Metal Company manufactures lead-filled treads used by the Navy Department.



Detail of lead-filled, brass base stair tread used by the U. S. Navy

Flat White Lead Paint Proven Excellent for Light Wells

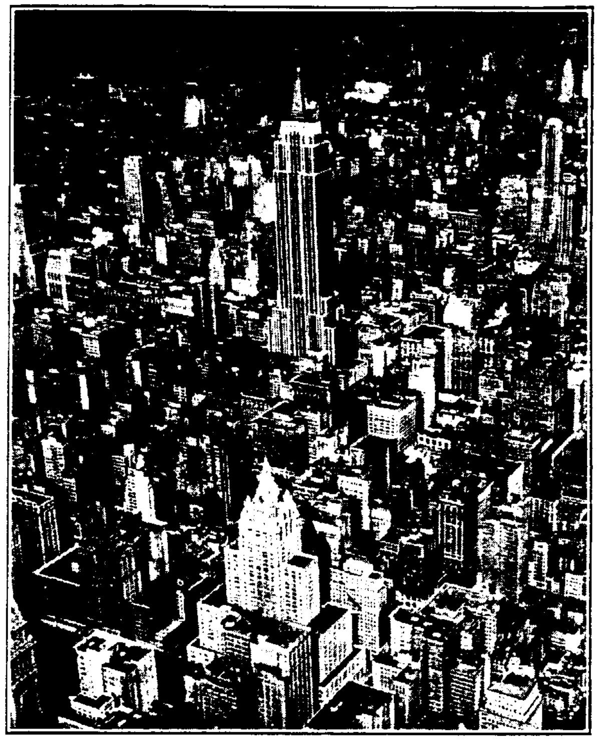
RECENT work by the Committee on Natural Lighting of the Illuminating Engineering Society has developed interesting information on "'white' materials with which light wells can be surfaced that will, on extended exposure, maintain their high light-reflecting qualities." In summary, the report states:

"1. That 'white' surfacing materials of equal initial reflectance do not decrease proportionately in brightness when exposed under identical weather conditions.

"2. That a properly designed flat paint would seem more efficient for maintenance of high brightness in light wells [that are located in large cities where dirt conditions are severe] than would the more durable surfacing materials having the same initial whiteness and reflectance."

Tests were made in model light wells. One was lined with white tile and two with cement whose finish was typical of average building construction. The two cement lined wells were then painted over the cement, but with different paints for the finishing coat. One was a high gloss durable outside paint, comparable to a white lead and linseed oil paint or other first grade outside paints. The other was a turpentine flat white paint chosen because it would chalk heavily. It was comparable to high grade flat paints for interior use. The following tables show the brightness at various intervals over the period of the test and the reflection factor before and after the test.

Model light wells, one side removed, on which tests were made. Left to right, tile, gloss white paint, flat white paint



WURTS BROS.-CURTISS WRIGHT PHOTO

This aerial photograph of part of New York gives an idea of the space required by light wells to gain proper lighting

AVERAGE WELL BRIGHTNESS ON EACH READING

Date of Reading	*Approximate Length of Exposure Months*	*Tiled Well Per cent*	*Gloss Painted Well Per cent*	*Flat Painted Well Per cent*
April 29, 1930	..	50.3	44.8	50.7
August 28, 1930	4	29.0	24.1	41.0
December 15, 1930	8	21.9	17.1	46.9
March 24, 1931	11	14.9	9.4	20.5
June 18, 1931	14	24.9	13.2	35.2
September 29, 1931	17	18.7	9.7	23.2
January 7, 1932	20	22.5	14.3	33.2
March 29, 1932	23	18.8	12.3	25.2
June 20, 1932	26	22.3	12.7	28.3

AVERAGE REFLECTION FACTOR

	Before Exposure	*After Exposure*
Tiled well	0.77	0.56
Gloss painted well	0.78	0.43
Flat painted well	0.78	0.60

Obviously the chalking of the flat paint had maintained its brightness well above that of the other finishes, but its protective value was practically gone, which naturally was not true of the other wells. The problem then is whether brightness or protection is to be preferred. In light wells brightness is essential. By washing the tile well, brightness was restored only from 22.3 per cent to 28.3 per cent, against initial brightness of 50.3 per cent. But by repainting the flat painted well, initial brightness could of course be totally restored. This may seem an expensive procedure, but it must be remembered that 75 per cent of the cost of painting is labor and that about an equal amount of labor would be required to wash tile wells and that even then original brightness of tile wells would not be restored, which would be reflected in larger light bills. Initial cost of tile wells is also greater.

Light wells whose brightness is reduced by dirt accumulation are generally in cities where land is expensive and where every square foot of land must bring as large a return as possible to make buildings pay. By using the flat white lead paint which maintains its brightness better and can be restored to its original brightness easily, the size of light wells may be reduced without decreasing interior brightness. This means the addition of many square feet of useful floor space, transforming waste areas into income yielding space.

Taking reading on the model light wells

Therefore, it would seem that from both the standpoint of reasonable cost and brightness, flat white lead paint, such as paint of the following formula, should be used in light wells:

PRIMING COAT

100 lb. pure white lead soft paste
2¼ gal. pure boiled linseed oil
2 gal. spar varnish
1½ gal. pure turpentine
Makes about 9 gal.

SECOND COAT

100 lb. pure white lead soft paste
2¼ gal. pure raw linseed oil
1 gal. spar varnish
1 gal. pure turpentine
1½ pt. pure drier
Makes about 7¾ gal.

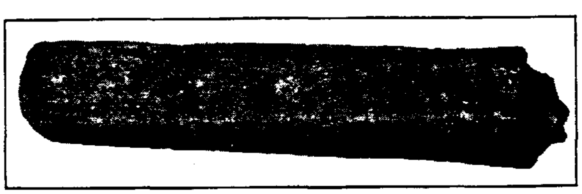
THIRD COAT

100 lb. pure white lead soft paste
2 gal. pure turpentine
½ pt. pure drier
Makes about 5¼ gal.

A German Lead Water Supply Line 200 Years Old

A RECENT issue of Chemiker-Zeitung, German technical magazine, tells of a lead water supply pipe line that was found buried at Gross Sedlitz Castle in Saxony. The date of installation has been determined at between 1723 and 1733. After 200 years in the ground the lead pipe is remarkably well preserved, whereas iron couplings which joined the sections of pipe are almost entirely corroded away. The pipe was apparently made by casting in a pipe-shaped mold, because there is no seam to indicate that it was made from sheet lead as were most lead pipes of the Romans and the Middle Ages. Moreover, the pipe was made before the time of the hydraulic press.

This is just another example of the great durability of lead pipe. In the United States water departments everywhere are familiar with this valuable characteristic of lead. Many of their lead water services have operated for more than half a century, and they can be expected to continue satisfactory operation for years to come. Lead pipe not only has the advantage of being made of the most durable common metal under most conditions, but has a wall thickness greater than that of other metals, which increases its life proportionately.



COURTESY FIRMA HUGO MORGENSTERN

Lead pipe from Saxony 200 years old

More Old Lead Services—This Time in Rochester, N. Y.

AN old and badly worn asphalt pavement in Plymouth Avenue South, Rochester, N. Y., was recently torn up and replaced by a new concrete pavement. At the time of replacement it was advantageous to replace service pipes under the old pavement because they were not of large enough diameter to serve present day needs. The old services that were removed were lead pipe that had been laid about fifty years ago. They were in good condition, according to Mr. Irving E. Matthews, City Engineer. They would undoubtedly have served successfully for many years more had not larger pipes been required.

First Oil-Filled Submarine Cables Rely on Lead Sheaths

UNITED Electric Light and Power Company of New York City recently laid across the East River the first three-conductor oil-filled submarine cables installed in this country. They were made in 2,350 ft. lengths and connect the Hudson Avenue Station of the Brooklyn Edison System with the United Company's lines on Manhattan. They were designed to operate at 27,000 v.

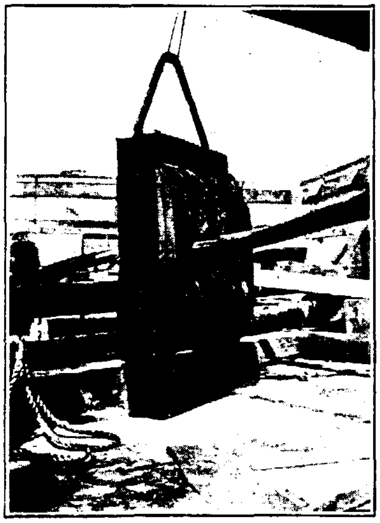
According to the General Cable Corporation, the cables are composed of three 500,000 C.M. sector conductors insulated with 200 mils of special supercalendered and graded paper, Type H Construction. In the interstices between the conductors are steel spiral oil channels having an inside diameter of ¼ in. The lead sheath contains 1 per cent tin and is 9/64 in. thick. The cable is armored with No. 4 BWG armor wires and covered with two reverse layers of hard jute. The outside diameter was 3.7 in. and each of these cables has a shipping weight of 26 tons.

Two cables were laid at a time in a narrow trench at the bottom of the river. About 1½ hours' time was required to lay these cables from shore to shore. The trench was then filled in with concrete in order to prevent any possible danger from dragging anchors. Oil pressure reservoirs were provided at each end to insure that the cables are at all times filled with oil.

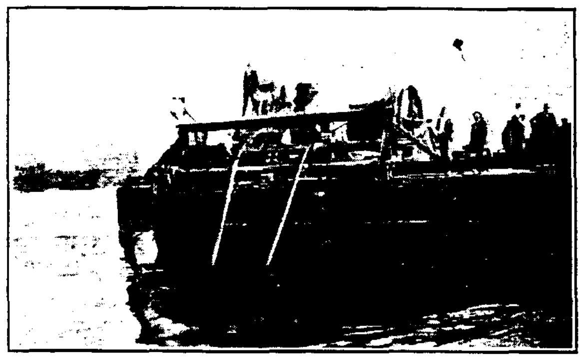
The difficulty of the undertaking is better appreciated when the amount of shipping going up and down the East River is considered. It was necessary to have traffic control of all shipping during the cable laying, which in itself was a major operation.

It is interesting to note that 6½ tons of lead were required to manufacture the lead sheath on each length of cable, as the successful operation of these cables is largely dependent upon the lead sheath.

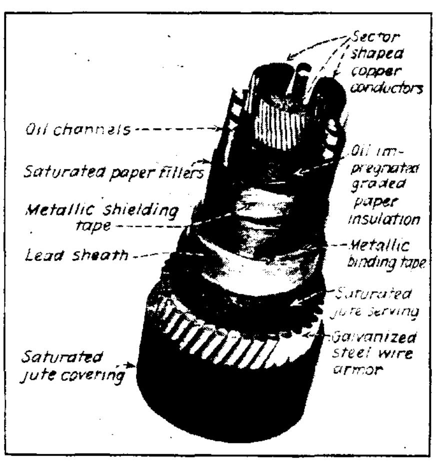
* * *



Two photographs depicting the operation of laying the first oil-filled submarine cable under the East River between Brooklyn and Manhattan Island New York



COURTESY GENERAL CABLE CORP.



Cut away section of oil-filled submarine cable, showing its construction

COURTESY GENERAL CABLE CORP.

Two Articles on Ornamental Lead

Two articles which should be read by those interested in hand wrought lead work are:

LEAD—"DULL AND BASE"—Has Power to Charm, by Wm. B. Betts, which appeared in the March-April, 1932, issue of Popular Homecraft, published by General Publishing Co., Inc., 737 N. Michigan Ave., Chicago, price 35c, and,

SHEET LEAD WORK FOR SHEET METAL MEN, in the June, 1932, issue of Sheet Metal Worker, published by Edwin A. Scott Publishing Co., Inc., 45 W. 45th St., New York City, price 25c.

The former describes in detail how the lead grille featured in the September issue of LEAD was made, as well as other lead cut-out work. The latter tells how leader-heads and other ornaments are hand beaten from sheet lead.

The Lead Industries Association invites inquiries on any subject relating to lead and will be glad to cooperate without obligation in the solution of your lead problems.