LEAD

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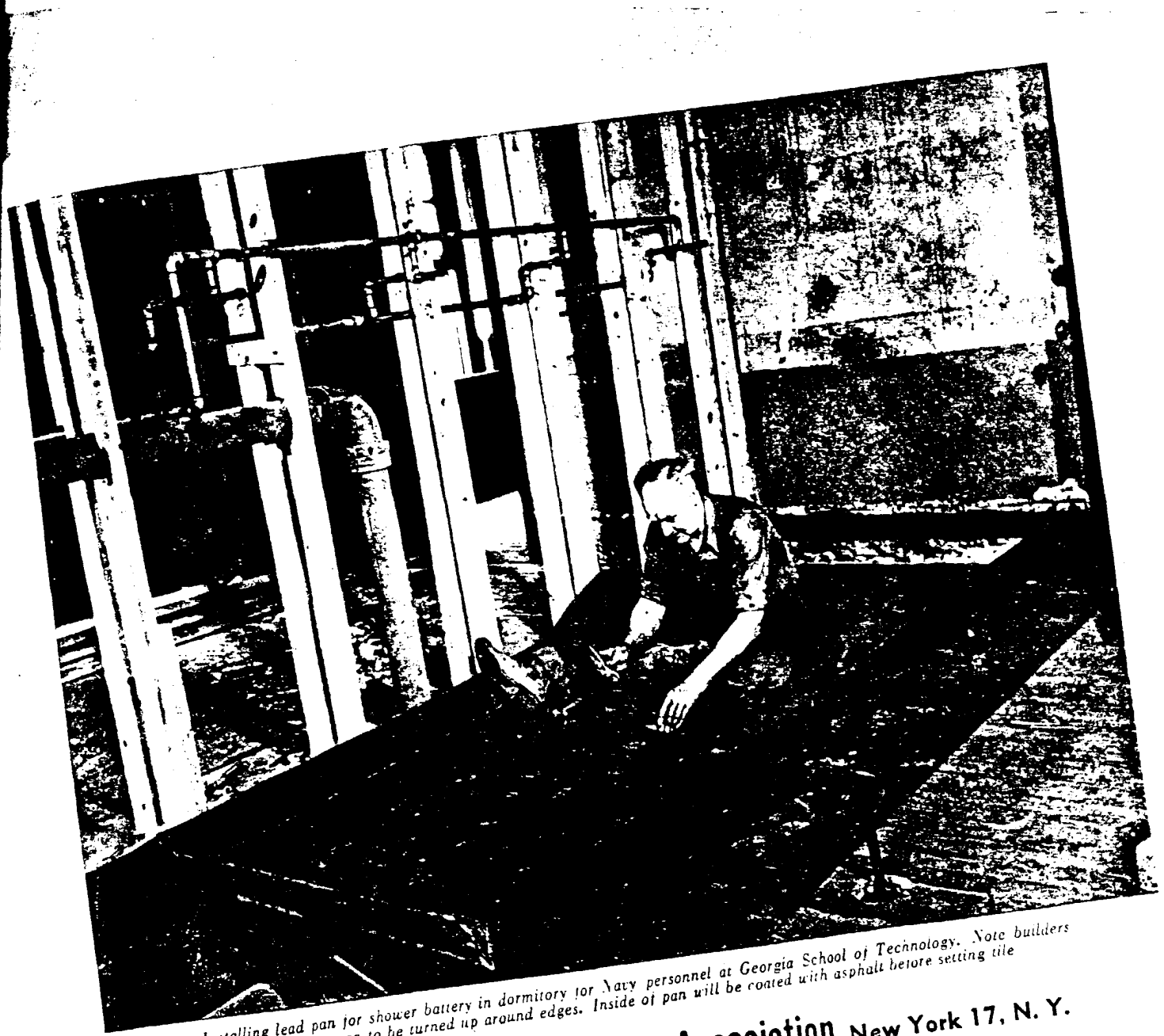


Installing lead pan for shower battery in dormitory for Navy personnel at Georgia School of Technology. Note builders felt under pan to be turned up around edges. Inside of pan will be coated with asphalt before setting tile

Lead Industries Association New York 17, N. Y.

Lead Welding Gaining Importance in the Plumbing Trade

FROM time to time in recent issues we have referred to lead welding as a means of joining pipes and fittings in plumbing installations. This process, also called "lead burning," has not been generally used in the plumbing industry although it is well known and is an indispensible feature in the construction of a great deal of industrial chemical equipment. However, due to apprehension that the current shortage of tin will curtail the amount of solder available, men in the plumbing business have been studying the possibilities of lead welding. They have found that this process is well adapted to regular plumbing practice and that it can be quickly learned by the workmen in the trade who are already familiar with the characteristics of lead. These men are accustomed to preparing joints for soldered connections in a manner almost identical with that used for lead welding, and they are quick to adapt their skill in handling molten metal to a slightly different condition.

Flame lead welding or "lead burning" is considered to have originated in 1837 with the invention of the hydrogen-air blowpipe. It is a true welding process. That is, it is the fusion of two or more pieces of the same metal together without the addition of any alloy or other kind of material. It produces a homogenous joint without variations in durability or physical characteristics such as thermal expansion. The art of lead welding is legitimately a part of the plumbers skill since the name "plumber" literally means one who works with lead.

The extent to which the plumbing industry of America is interested in lead welding is indicated by the number of men who are seriously studying to perfect themselves in its use. Many classes have been organized in cities clear across the country to give plumbers the opportunity to learn this skill. These classes in many cases are sponsored by union locals in cooperation with schools or independently in employers' shops. Some individuals have obtained the necessary equipment and have taught themselves with the help of books or the articles on lead welding published by the Lead Industries Association in *Plumbers' Forum.*

The practicability of class instruction in lead welding has been well demonstrated by some of the longer established classes. The members of classes in St. Louis, Philadelphia, St. Paul, Minneapolis, Denver and other cities have shown that they can not only learn to weld lead but can plan their work to take the greatest advantage of the flexibility and other characteristics of lead pipe and sheet.

This activity of the men of the plumbing trade is an example of the kind of cooperation that is going to win the war. These men, by devoting their off-work hours to study, are helping to assure architects and engineers that the sanitary security provided by lead plumbing will remain available for both civilian and military projects. They are preparing to save a substantial quantity of tin by reducing the amount of solder necessary to make each plumbing installation. The War Housing Manual of the Housing Branch of the War Production Board recognizes lead welding as a satisfactory means of joining plumbing pipes. The specification of lead welding as an alternate for wiped joints will give the men of the plumbing trade the opportunity to put their newly acquired skill to the service of their country.

Lead Base Alloys Offer Savings Of Critical Metals In Castings

LEAD-BASE casting alloys have found many new applications since the war emergency began. The plentiful supply of lead and antimony, of which they are largely composed, has made possible the saving of much critical metal. The lead alloys should not be considered as able to make a general replacement of zinc-base, copper-base, aluminum-base and other alloys, for the properties are quite different. Yet they are just as suitable, sometimes superior, for many applications if their properties, advantages and limitations are clearly recognized.

Die cast lead practice bomb now being used by U. S. Navy

The strength of these alloys is comparatively low and falls off quite rapidly at elevated temperatures. On the other hand, casting qualities are excellent and the castings take electroplate, paint, enamel or lacquer finishes well. Such finishes are not usually needed except for decoration because the corrosion resistance of the lead alloys is exceptionally good. Furthermore they are not subject to dimensional changes with the passage of time. They are suitable for casting in almost any kind of mold, either by gravity or under pressure, and the low melting point simplifies production problems.

Many articles that require no great strength can just as well be cast from lead alloys as from stronger metals

without change of design. Many others, in which strength is a more important factor, can be cast from lead alloys by making minor design changes to reinforce them at points of stress. The low cost of the metal often permits use of more metal without increasing cost when a change is made from a more expensive metal.

In general, good lead-alloy casting metals containing little or no critical metals are available with tensile strengths ranging from about 3,000 to 11,000 lb. per sq. in., with Brinell hardness ranging from 7 to 22, and with points of complete liquefaction ranging from about 475 to 600 deg. F.

A few examples of what has been done with these lead-base alloys will serve to illustrate both their possibilities and limitations. The U. S. Navy is, for instance, saving many tons of critical metal by changing its practice bombs to lead-alloy die-castings from zinc alloy. Another example is the conversion from brass to lead alloy of threaded trap screws or clean-out plugs for plumbing traps, functional items requiring no great strength as the only stress involved occurs when inserting or removing the screw. Still other examples are the covers for relays, formerly aluminum die-castings, and the instruction and name plates for machinery and equipment described in LEAD, November, 1942.

Die-cast lead trap screw in place and, left, showing integral cast threads

An illustration of slight redesigning to make the use of a lead alloy entirely suitable may be found in floor flanges, formerly made of brass, for connecting water closets to the floor and to the soil pipe system. By making the flange somewhat thicker and providing reinforcing ribs on the radial webs connecting the inner and outer rings, sufficient strength was obtained. The lower cost of antimonial lead permitted the use of this extra metal.

It will be recalled that before complete conversion of the automobile industry to war production, lead-base die-castings, chromium plated, were used for much of the ornamental trim.

Die cast lead closet floor flange showing added stiffening ribs

These are only a few examples of what has already been done. Doubtless a more general understanding of the properties of lead-base casting alloys will result in further savings of critical metals. The Lead Industries Association will be glad to cooperate with manufacturers who think the properties of lead alloys might help them. The accompanying table gives an idea of what may be expected of some of these alloys, but does not cover the entire range of available alloys suitable for casting.

PROPERTIES OF SOME LEAD-BASE CASTING ALLOYS

Alloy	*Specific Gravity*	*Tensile Strength Lb./Sq. In.*	*Elongation Per Cent*	*Brinell Hardness*	*Charpy Impact Ft. Lb.*	*Liquidus Deg. C.*	*Solidus Deg. C.*	*Expansivity Coefficient per Deg. C.*
Antimonial Lead (*Gravity Cast*)								
2% Sb	11.18	4200	16	8.0		316	247	0.0000281
4% Sb	11.03	5660	22	10.1		300	247	0.0000278
6% Sb	10.88	6840	24	11.8		285	247	0.0000272
8% Sb	10.74	7420	19	13.3		270	247	0.0000267
10% Sb	10.59	7670	15	14.6		257	247	0.0000261
12.5% Sb	10.42	7380	11	15.1		247	247	0.0000255
*Special Alloys**								
#1 Die cast	10.38	9020	2	19.1	1.3	262	250	
Gravity cast ..		10500	2	21.0	1.1			
#2 Die cast	10.57	9140	4	17.2	2.1	258	247	
Gravity cast ..		10100	2.5	21.6	2.4			
#3 Die cast	10.80	9300	6	16.0	2.75	278	247	0.0000270
#4 Die cast	10.38	9800	5.5	17.0	1.5	253	247	0.0000251
#5 Die cast	10.15	10200	2.8	22.0	1.5	295	247	0.0000240
#6 Die cast	10.8	8500	4.0	15.8	2.5			

* Further information on request.

Note: All tests at room temperature.

Sprayed Lead Coating Reclaims Corroded Cast Iron Filter Plates

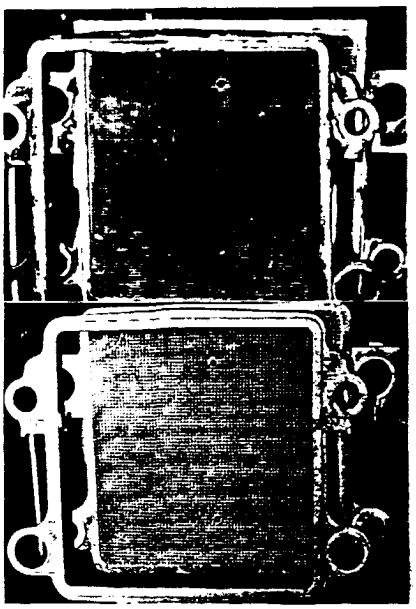
THE use of lead for corrosion resistant coatings and linings is a long established practice in the chemical industries. It is customary for many different kinds of equipment to be so protected from various solutions before they are placed in service. Occasionally, however, it becomes necessary to apply protective coatings to equipment after it has been in use for a while. If such coatings can be applied in sufficient thickness to build up already damaged areas to original dimensions, they will be doubly effective in salvaging as well as preserving existing equipment.

A recent application of a lead coating process by a western mining and refining company accomplishes the two purposes very effectively. The Sullivan Mining Company of Kellogg, Idaho, in its electrolytic zinc plant have occasion to remove precipitated impurities from a zinc sulphate solution by means of plate and frame filter presses. The plates and frames of unprotected cast iron were subject to corrosion damage by the solution. It was found that these parts could be not only protected from further damage, but actually built up to original dimensions with lead applied in a molten spray.

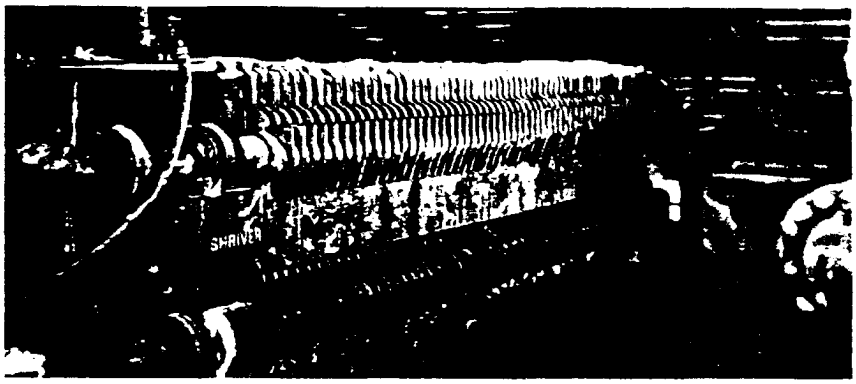
This process is accomplished by a gas and air operated gun which automatically feeds a lead wire into a flame where it is melted, atomized and blown with considerable force onto the surface to be covered. The iron plates are first cleaned and roughened by shot-blasting and the lead coating is applied. The plates are then ready to be put back into service, more durable than they were when new.

While this use of the corrosion resistant characteristics of lead was developed during normal times as an operating economy it becomes of especial importance now as a conservation measure. The metal spraying process has also been used successfully for applying lead coatings to ventilating equipment handling acid fumes and for other industrial and commercial uses for purposes of economy and conservation. Lead coatings so applied can be the means of prolonging the life of much standing equipment which is threatened with destruction or damage by severe exposures.

Used cast-iron filter plates before and after cleaning and spray coating with lead



Lead coated filter plates and frames in use



War Housing Conversion Projects Follow Local Plumbing Codes

THE conversion of existing structures into housing accommodations for war industry workers is getting well under way. Many architects in war industry centers are preparing plans and cost estimates and a number of projects are under construction. Buildings selected for conversion to multiple units vary from large single family houses to business and loft buildings but in nearly every case the structure is within the limits of town or city and the work is subject to local ordinances and inspection.

The Home Owners Loan Corporation which is in charge of Government financed housing conversions is taking full advantage of labor conditions by requiring that work shall be done in compliance with existing customs, ordinances and codes. The Master Specification for conversion jobs states that plumbing installations ". . . shall be made in accordance with the rules and regulations of the local authority having jurisdiction."

This indicates that in communities where lead is required by the plumbing code its specification for use in government financed housing conversions will be a matter of course. In localities where the use of lead for closet bends, wastes, vents and traps

is optional it should be used in the interests of conservation of other more critical materials.

One comparatively large conversion project now nearing completion in Pueblo, Colo., will provide 29 family living units in the Broadway Arcade Building. In compliance with the Pueblo Plumbing Code and the H.O.L.C. master specification, all soil lines and stacks are lead-calked cast iron. Closet bends and drum traps are of extra heavy lead and all fixture waste connections are of lead pipe. All of these materials bear the Lead Industries' Seal of Approval and the owner of the Broadway Arcade knows that his building conforms to the requirements of the Plumbing Inspection Department of the city of Pueblo and that he can safely operate it as an apartment after the termination of the lease period and the Government returns it to his possession.

Another and quite different type of conversion job is being done at the Georgia School of Technology at Atlanta, Ga. Here a large building which has been used for classrooms is being converted into a dormitory for Naval personnel stationed at the school. This work is also being done under the local code and is a complete lead and cast-iron soil pipe job. In addition, lead pans under shower batteries are being installed on both second and third floors.

These pans are installed over an existing wood floor in exactly the same manner as is correct for new construction, either wood or concrete. They are laid on a cushion of one thickness of 15 lb. building felt which is turned up around the edges to protect the entire bottom and outside of the pan. After forming, each pan is coated heavily inside with asphalt. This is to protect the lead until the free lime in the tile mortar bed becomes inactive. It is also good practice to lay a layer of the building felt inside the pan before placing the tile mortar as a protection against possible mechanical damage.

Bathroom and sink roughing in the Broadway Arcade Building, Pueblo, Colo.

The flexibility of lead and its ease of installation with a minimum number of joints make it an especially desirable material for conversion and remodeling work but these advantages are in addition to the qualities of permanence and safety which are the reasons for its requirement by so many efficient and conscientious plumbing inspection departments.

Lubrication of Heavily Loaded Gears Improved With Lead

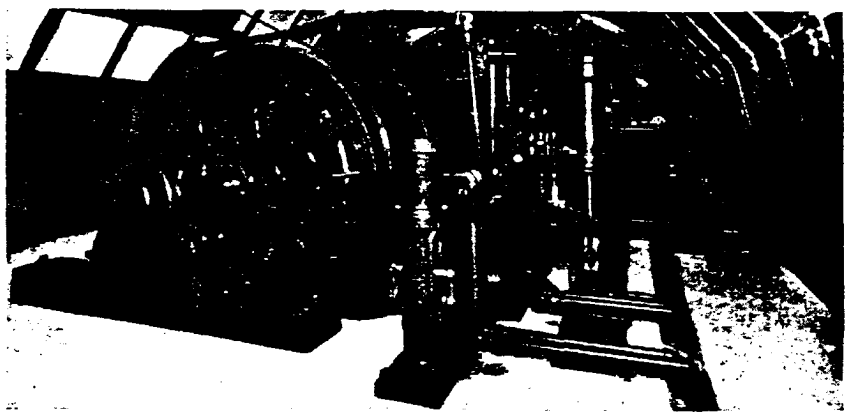
THE lubrication of the gears of heavy machinery is a difficult problem, especially if the gears operate at a fairly high rate of revolution. Heavy pressures squeeze ordinary grease out from between the teeth and centrifugal force tends to throw it from the rim of the wheel. A lubricant which will remain in place under great loads and adhere to the metal will be far more durable than many of the ordinary saponified hard oil or fibre types of greases now in common use.

Metallic lead has definite lubricating properties. The application of lead as a lubricant to gears of heavily loaded machinery is a relatively new development which is proving of interest to operators of heavy equipment.

The lead is applied in the form of a fine powder mixed into a high viscosity grease which acts as a carrier. In operation the lead powder is forced into any pores or scratches on the surface of the gear teeth and forms a thin uniform film which in combination with the grease provides an exceedingly low friction surface. This coating is renewed with each succeeding application thus providing continuous metallic protection as well as lubrication.

The manufacturers of lead-bearing gear grease state that it is extremely tackey and will not throw, that smaller quantities can be used than are necessary with ordinary gear grease and that it will immediately reduce friction and noise on all open gear machines. It is used on hoisting machinery in mines and shipyards, on electric locomotives, on ore roasting machinery and in numerous other exacting applications. It is also being used on hoist ropes under heavy service in severe exposure and is reported to be giving excellent service.

High speed hoist in a Utah mine lubricated with leaded gear grease



No. 20

New Jersey Farm Houses Show Charming Detail

The two story section of the Silas Tuttle House in Whippany, N. J., was built in 1775. The present owner still keeps it well protected with pure white lead paint

THE part played by New Jersey in the battles incident to the establishment of this Republic is well known and recorded in history but the early prosperity and traditions of gracious living as recorded by domestic architecture have received less notice than is their due. Perhaps the reason for this is that the early settlers followed agricultural pursuits and so lived in isolated farmsteads rather than in the compact villages and towns which grow up around manufacturing and maritime industries. However, many such records exist and their discovery is often all the more exciting for the finding of them surrounded by urban developments of later date.

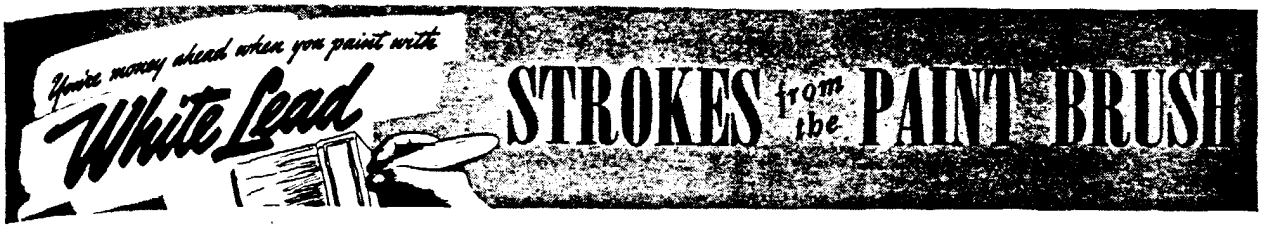
The three dwellings shown on this page were once farmhouses although they now stand within the corporate limits of towns. The Joseph Corey and Andrew Corey houses in Caldwell are on land which was purchased from the Indians in 1702. The original wing of the Silas Tuttle house at Whippany, which was built by Joseph Tuttle in 1675, served as the first post office of Whippany.

These houses are well cared for and their owners cherish them as homes as well as historic landmarks. Each priceless detail is sealed against the destructive forces of weather with durable white lead paint to preserve them for many more years of useful service.

The Joseph Corey House, left, and the Andrew Corey House, right, Caldwell, N. J., built in 1766 and 1776 respectively are the cherished homes of their present owners who regularly use pure white lead paint to keep them sound and beautiful

PHOTOS BY DAYTON SNYDER

THIS IS NO. 20 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.



Importance of High Quality in Putty Often Overlooked

OF all the materials used by painters, putty probably receives the least consideration in selection and specification. In fact, putty is often considered something of a joke. Five pounds of "quarter inch putty" is a painters equivalent of the left handed monkey wrench that is sometimes the object of the carpenter or plumber apprentice's search. But putty is not a joke and the use of putty of inferior quality can have serious consequences. In addition to securing glass in window sash, putty has the legitimate function of filling nail holes and other unavoidable indentations in the surface to be painted, but mere bulk is the least important attribute it must possess. Putty that shrinks excessively or does not stick permanently in place is worse than useless.

For window sash and all other uses where it is exposed to the weather the kind of putty used for many generations is still the most servicable. It is a mixture of white lead, whiting and linseed oil. Some putties are made of whiting and linseed oil only and cheap putties may even be made of marble dust and petroleum oil.

Composition Similar to Paint

Putty used on exteriors is subject to the same exposures as paint and the best putty is made of the same materials as the best paint plus some whiting to give it bulk. Probably the most widely used combination specified by architects and used by experienced painters consists of soft paste white lead to which is added just enough whiting to make a workable mass. This means about 12 ounces of whiting to one pound of soft paste white lead and it makes a very rich putty with excellent holding power. In making this mixture it will at first seem too stiff and dry but continued mixing and pounding will make it smooth and workable with the fingers or putty knife. This is the type of putty that was commonly used on much of the early work in this country and many old houses can be found with the original putty sound and in excellent condition.

Prime Before Puttying

Putty should never be applied to bare wood. All nail holes and other depressions should be puttied after the priming coat is applied. Putty sticks best to a painted surface and sash also should be primed before the putty is applied. In fact if it were practical it would be excellent practice to paint around the edge of the glass before applying the outside putty. Cases are not uncommon where wind driven rain penetrated between putty and glass and so leaked through the sash. Paint would have adhered to the glass and caused the putty to seal tightly against moisture.

On repainting work the checking and reputtying of window sash is an important duty of the painter. If any putty has loosened or fallen out it is best to remove all of the old putty in order that new material can be applied in a smooth and workmanlike manner. Sections still adhering to the wood should be chipped out carefully to avoid damaging the sash. After replacing any damaged glazing points the glass rebate should be primed with white lead paint. When the paint is dry the rebate is pressed full of white lead putty which is knifed off smooth and later painted with the rest of the sash.

While on the subject of sash, several points might be noted where careful painting can be of great importance. It is good practice to run the paint just slightly beyond the edge of the putty onto the glass to form a seal. This must be done accurately to line so that it will not be cut or scraped off by the window cleaner who might carelessly cut into the putty. Also, both top and bottom edges of double hung sash should be painted to seal the end grain of the side rails. All four edges of casement sash can be painted because they are accessible and are not required to slide. Careful sealing of exposed end grain will greatly lengthen the life of the sash.

White Lead Putty Lasts

The strength and durability of white lead putty is the result of the same interaction between white lead and linseed oil that makes pure white lead paint tough and long lasting. By reason of similarity of materials white lead paint adheres to white lead putty and will not scale off. White lead putty like white lead paint can be depended upon to stay in place and do its job for long periods of time.

BUY
WAR BONDS
AND STAMPS
EVERY PAYDAY

WPB Eases Restrictions on Use of Lead

RESTRICTIONS on the use of lead have been further eased by the latest amended General Preference Order M-38, issued by WPB on May 26, 1943. This change is in recognition of the excellent domestic supply situation and the existance of a large emergency stockpile of lead in the hands of the Metals Reserve Company.

The amended order permits all uses considered essential by WPB and removes limiting restrictions as to weights and thicknesses of metal for specific purposes. Definitions for the purpose of the order include antimonial lead, the use of which is increasing in die castings and in sheet form.

Prohibition of the use of lead in "glass for ornamental purposes" does not mean came lead used for setting window glass but does mean lead used as an ingredient of glass used in ornamental objects.

Special uses of lead such as x-ray protection, scientific or industrial equipment were not restricted in the original order nor were lead plumbing or painting materials limited.

In connection with plumbing and water service uses of lead it is important to note that the General Preference Order for Tin, M-43, issued on May 25, permits the use of solder containing up to 32.5 percent of tin for plumbing purposes and solder containing up to 38 percent of tin for water service installation and repair. This wise allowance of limited use of precious tin will encourage the continued use of lead for plumbing and water services which might otherwise have to be of iron or steel, so much needed for military purposes.

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.

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HOW LUMBER AND PAINT KEEP YOUR HOME ALWAYS IN STYLE

SOME PAINTING PROBLEMS AND THE ANSWERS

STOP DEMON RUST

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WHITE LEAD PAINT FOR DEFENSE HOUSING

SUMMARY OF NOTES ON LEAD ROOFING

NEW SIMPLIFIED STANDARD FOR LEAD TRAPS AND BENDS

COMMERCIAL STANDARDS:
Calking Lead, CS94-41
Lead Pipe, CS95-41
Lead Traps and Bends, CS96-41

LEAD PLUMBING FOR DEFENSE HOUSING

***LEAD EQUIPMENT USED IN INDUSTRY**

By F. E. Wormser, Secretary of Lead Industries Association

A summary of the uses of lead in the production and handling of corrosive chemicals. Reprinted from "Metal Progress" to be included in the next edition of "American Society of Metals Handbook."

***NEW LEAD COATING PROCESS ELIMINATES USE OF ZINC ALLOYS**

By W. Yonkman, Engineer, Western Electric Co.

A description of a successful hot dip lead coating process with complete instructions for changing over from hot dip galvanizing using the same equipment.

* Not previously listed.

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