

“Maintenance of Interior Marble”

By D. W. Kessler, Research Associate, National Bureau of Standards
W. D. Carol, Sales Representative, P.O. Box 945, Columbus, Ohio
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The following sections are included in this booklet:

Part I. Cleaning: 1. “Description of Trade Cleaning Preparations,” 2. “Choice of Cleaning Preparation,” 3. “Effects of Scouring Grits,” 4. “Effects of Various Salts in Marble Cleaning Preparations,” 5. “How to Determine the Presence of Salts in a Cleaning Preparation,” 6. “The Use of Soap for Cleaning Marble,” 7. “Ammonia Water,” 8. “Javelle Water,” 9. “Oxalic Acid,” 10. “Soap Powders,” 11. “Soap Flakes,” 12. “Oxygenated Soap,” 13. “Liquid Soap,” 14. “Rinsing,” 15. “Discolorations from Cleaning Preparations,” 16. “How to Soften Water,” 17. “Frequency of Cleaning.”

Part II. Treatment of Stains: 1. Iron, 2. Copper or Bronze, 3. Ink, 4. Tobacco, 5. Urine, 6. Fire, 7. Lubricating Oil, 8. Linseed Oil, 9. Rotten Wood, 10. Coffee, 11. Iodine, 12. Barium Sulphide, 13. Perspiration, 14. General Service Stains.

Part III. Special Treatments for Marble: 1. “Polishing Marble,” 2. “To Prevent Stains from Iron,” 3. “To Prevent Stains from Putty,” 4. “To Waterproof Marble,” 5. “Treatments for Exterior Polished Marble.” & General Recommendations

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Peggy B. Perazzo

Email: pbperazzo@comcast.net

November 2011

Ozark Gray Marble



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P R O D U C E D B Y T H E

Carthage Marble Corporation

Carthage, Missouri

**Maintenance of
Interior Marble**

By

D. W. KESSLER, *Research Associate*
National Bureau of Standards



Compliments
of
Carthage Marble Corporation
CARTHAGE, MISSOURI

Published by
National Association of Marble Dealers
648 Rockefeller Building
CLEVELAND, OHIO

There is No Substitute for Marble

Maintenance of Interior Marble

By

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W. D. CAROL
SALES REPRESENTATIVE
P. O. BOX 945
COLUMBUS, OHIO

Published by

National Association of Marble Dealers

648 Rockefeller Building

CLEVELAND, OHIO

*MAINTENANCE OF INTERIOR MARBLE

Based upon investigations at the National Bureau of Standards by D. W. Kessler, Research Associate. (a)

(Research work financed by the National Association of Marble Dealers.)



PREFACE

THIS booklet is intended mainly for the use of those charged with the care of interior marble work. It embodies in brief form the results of a research program carried out at the National Bureau of Standards under the auspices of the National Association of Marble Dealers. Various phases of the cleaning problem are discussed from a practical standpoint. Methods for eradicating all the common types of stains are given and a few suggestions are made which may prove of use to the marble setter.

The recommendations herein are based on: 1st, the results of over 10,000 laboratory tests and experiments; 2nd, a comprehensive study of numerous marble installations; 3rd, the experience of persons who have been long associated with such problems in a practical way.

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(a) The complete report of this research is being published as a Bureau of Standards Technologic Paper.

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PART I. CLEANING



1. Description of Trade Cleaning Preparations

THE most widely used preparations for cleaning marble floors consist of a scouring grit, powdered soap and carbonate of soda mixed in the dry form. These vary in weight from 40 to 55 pounds per cu. ft., depending on the amount of grit present, this being the heavy ingredient. The relative amounts of these constituents vary considerably in different preparations. The following statements based on chemical analyses of several trade preparations of this type will convey some idea of the proportions found:

Ingredients	Amounts
Scouring Grit (b).....	30 to 90 per cent
Sodium Carbonate (c).....	2 to 50 per cent
Soap (anhydrous).....	2 to 9 per cent
Water.....	1 to 20 per cent

One widely used preparation of this type is a mixture of sodium carbonate and sodium bicarbonate (d) with the grit and soap. Most preparations of this type are sold in the dry form but a few have been found which are mixed to a paste with water. In such preparations the water content may be as high as 40 per cent of the weight.

Another type of cleaning preparation marketed in the dry form consists of all water-soluble ingredients, that is,

(b) Scouring grits usually consist of volcanic ash or finely crushed quartz.

(c) Sodium carbonate in the form of crystals is called washing soda. In the dry powder form it is known as soda ash.

(d) Sodium bicarbonate is also known as baking soda and bicarbonate of soda.

it contains no scouring grit. This type embraces a considerable variety of compositions such as: sodium carbonate and powdered soap, sodium carbonate and sodium bicarbonate, sodium carbonate and trisodium phosphate, or trisodium phosphate alone.

Liquid soap preparations are also used to some extent, some of which contain small amounts of scenting or waxing ingredients.

Miscellaneous materials or preparations which have been used more or less extensively are: soap, ammonia water, Javelle water, oxalic acid, oxygenated soap and scouring grits with water.

2. Choice of Cleaning Preparation

The main factors to be considered in choosing a cleaning preparation for any particular case are: first, cleaning effectiveness; second, protection of the marble. A building superintendent may find by experience that a particular type of cleaning preparation is best suited to his purpose. The next step is to assure himself that the cleaning preparation is not proving detrimental to the appearance or permanence of the surface finish or of the marble itself.

3. Effects of Scouring Grits

As indicated above, the common grits now used in cleaning preparations generally consist of volcanic ash or crushed quartz which are hard minerals. These are appreciably harder than the marble and will abrade the surface to some extent. Whether this will prove objectionable or not will depend largely upon the kind of finish the marble surface has. Coarse particles in the grit are apt to produce scratches on marble floor tile, but usually the grits are so fine that no ill effects will occur from their use on marble floors or "hone finished" marble. Hone finished marble is very smooth and appears somewhat glossy but can readily

be distinguished from polished marble. The hone finish and polish are commonly found on wall or standing marble, railings, balusters, etc., but seldom if ever on the floor marble. Before using a scouring grit on finer finishes than that of the floor tile one should first ascertain by trial just what the effect is going to be. To do this, choose some inconspicuous part of the marble work for a test. Fold a small piece of cloth in three or four layers, dip it in water, then into the grit or cleaning preparation. Press the cloth firmly to the marble with the forefinger and scrub back and forth along the same path. Keep a considerable amount of grit on the rag until 100 strokes are made. Then wipe the surface dry and examine closely from different angles, using a flashlight if needed. If the character of the finish has not been visibly changed the grit may be considered reasonably safe for use on that character of finish.

Evidently a specification as to the size of particles in a cleaning grit is desirable. The laboratory study of the common grits used in trade cleaning preparations has indicated that particles passing a 100 mesh sieve will not produce visible scratches on marble in the usual cleaning process. Particles which are retained on the 100 mesh sieve are apt to cause undesirable results on a hone finish. Very fine particles have no particular scouring value and a considerable amount of such is undesirable on account of its making rinsing more difficult.

If polished marble is cleaned with preparations containing hard grits which are reasonably free from coarse particles, the polish will finally be reduced to a surface approximating that of a hone finish. In many cases the hone finish may not prove objectionable but where an investment has been made in polished marble it is not usually desirable to change it to a less expensive finish. Furthermore, the use of hard grits on polished marble seldom reduces the polish uniformly and for this reason some parts of the marble will show the hone finish while other parts retain the polish, which is particularly undesirable.

In using a grit on marble floors one should also consider what may happen to the base slab of the wall-work. This is

usually polished marble and near the floor the mops are rubbed against it. It is rather common to see the appearance of the base slab rather badly marred due to the effects of harsh grits. Due to the undesirable appearance that may result from the use of hard grits in cleaning polished marble, considerable attention has been given in the research to the effectiveness of grits composed of softer minerals. The only minerals which appear to meet all the requirements are soapstone and talc. These are plentiful, can be readily crushed and graded to the required degree of fineness, and should prove entirely feasible for the purpose. The proper grading for the crushed material is about as follows: All the particles should pass a 100 mesh sieve and be retained on a 300 mesh.

4. Effects of Various Salts in Marble Cleaning Preparations

In a chemical sense such compounds as sodium carbonate, sodium bicarbonate, trisodium phosphate, etc., are called salts. Such salts have long been used in various preparations for cleaning marble and the fact that they do not more often cause serious trouble, speaks well for the endurance of marble. Numerous and extensive experiments have been made to determine how severe the action of such salts may prove to be under various conditions. If a solution of such salts is allowed to penetrate the marble, salt crystals form in the pores as the marble dries. These salt crystals grow in size as the process is repeated, finally exerting great pressure within the marble. Numerous scrubbing tests with cleaning preparations containing the commonly employed salts have proven that this crystalizing action causes a progressive effect which is very injurious to the marble. It may manifest itself in a somewhat different way on different marbles. In some cases the effect becomes apparent by surface spalling of the marble while in others visible injury may not become apparent for a long period of time. Careful measurements of the strength and elasticity have indicated that all marbles

suffer from scrubbing with preparations containing salts, and that some marbles are greatly reduced in strength before visible injury becomes apparent. Even the strongest and densest marbles cannot resist this action indefinitely. Cases have been found where the salts in cleaning preparations have damaged the marble within a few years.

The surest way to prevent such injury to marble is to avoid the use of cleaning preparations containing such salts. However, it is quite evident that these salts aid materially in the cleaning action and in some cases their use may be deemed necessary. **The research has indicated that the injurious action of these salts may be largely prevented by rinsing the marble with clear water just before each cleaning with a preparation containing such salts.** The preliminary rinsing need not be made a laborious task. All that is necessary is to thoroughly dampen the surface. This may be done with a sprinkling can or spray. Cases in which this process has been used have resulted in a saving in amount of cleaning materials.

5. How to Determine the Presence of Salts in a Cleaning Preparation

From the above statement it appears that the building superintendent should inform himself as to the composition of the cleaning preparation he is using. Statements of selling agents in this connection cannot always be relied upon since they seldom know the composition of the material they are selling. If a statement from the manufacturer of the preparation in question cannot be had it may be advisable to have a chemical examination made. The Secretary of the National Association of Marble Dealers, 648 Rockefeller Building, Cleveland, Ohio, can supply this information on several of the common trade preparations.

Simple tests may be applied which can be relied upon to show the presence of the more common salts employed in cleaning preparations. Dissolve a tablespoonful of the preparation in a glass of water and add several drops of

hydrochloric acid. If it produces a strong effervescence one may conclude that a carbonate salt is present, such as sodium carbonate, sodium bicarbonate or ammonium carbonate. To test for a phosphate salt in the cleaning preparation one may employ a solution of silver nitrate. This can be obtained from any druggist or chemical supply house. One ounce of silver nitrate crystals will prove sufficient for numerous tests. Dissolve about one half ounce in a pint of water and keep it well corked in a brown glass bottle. To perform the test for phosphate salts, stir a tablespoonful of the cleaning preparation in a glass of water, allow undissolved matter to settle, pour off the clear liquid, and add to this a few drops of the silver nitrate solution. If a yellow curdy precipitate forms one may assume that a phosphate salt is present.

6. The Use of Soap for Cleaning Marble

Soap is one of the main constituents of a great many cleaning preparations and may be regarded as a very important ingredient. Soap alone, if properly used, is believed to be the safest detergent for all marble cleaning. Certain precautions should be taken in its use which are as follows: 1st, select a pure white soap; 2nd, soften the water before dissolving the soap in it; 3rd, dampen the marble surface with soft water before applying the soap solution; 4th, use soft water for the final rinsing. Most city waters need a special treatment to render them soft. Softening treatments will be described under another heading. The effect of soap when used with hard water for cleaning marble is to form a waxlike coating on the surface which tends to obscure the true character of the marble. This is due to the formation of insoluble soaps with the hardness constituents of the water which accumulate on the marble surface and are difficult to remove. Softening processes precipitate the hardness constituents from the water and when soap is used with a properly softened water this trouble will not be experienced.

7. Ammonia Water

Ammonia water has been used to some extent for cleaning polished marble and good results have been claimed for it. On the other hand, it has been known to produce a yellow discoloration. From the laboratory studies with ammonia water it appears that some marbles are discolored by it while others are not. However, those marbles which were discolored did not show such effects until they had been exposed to the ammonia water treatment for several months. Hence, it is concluded that an occasional use of ammonia water will not produce any undesirable results.

8. Javelle Water

Javelle water is well suited for use on polished marble and particularly so for toilet stalls because of its disinfecting and deodorizing properties. It may be purchased at drug stores but it will usually be found more satisfactory to make it up on the job just before use. The materials needed are chlorinated lime (sometimes called chloride of lime or bleaching powder) and washing soda. Three quarters of a pound of chlorinated lime and three pounds of washing soda added to water will make 10 gallons of Javelle water of the desired strength for use. The following method of making this preparation is recommended: Put the chlorinated lime into an enameled pan and add water slowly, mashing the lumps until it is reduced to a paste. Dissolve 3 pounds of washing soda or $1\frac{1}{2}$ pounds of soda ash in 1 gallon of warm water. Pour this into a two gallon stone-ware jar and add the lime paste. Add water enough to fill the jar, cover and allow the lime to settle. Dip or syphon off the clear liquid and dilute with four times its volume of water before use. The Javelle water purchased from the drug stores is usually of the same strength as that resulting from this formula and should also be diluted with four times its volume of water before use.

It is advisable to dampen the marble surface with clear water before applying the diluted Javelle water. This is

quite effective in clearing up several kinds of stains. It is a bleaching agent and should not be allowed to drip on the clothes or other fabrics. It is also quite corrosive to metals, hence, if it comes in contact with metal fixtures they should be immediately washed with clear water and dried.

9. Oxalic Acid

Although oxalic acid has been used to some extent for cleaning interior marble it is usually through ignorance of its real effect. Acids of all kinds dissolve marble. Oxalic acid is a weak acid and its effect on marble during a few cleanings would be slight, but constant use will inevitably destroy the polish or result in a dull, rough surface.

10. Soap Powders

Soap powders usually contain a high percentage of sodium carbonate and hence if used frequently one should guard against the action of the salt as described on page 10. Furthermore, this as well as any other preparation containing soap should be used with **soft** water.

11. Soap Flakes

Soap flakes ordinarily consist of soap alone and will usually prove perfectly satisfactory for marble cleaning purposes if used in accordance with the procedure outlined on page 10 for soap.

12. Oxygenated Soap

Certain preparations on the market consist of soap flakes and a small amount of a salt which liberates oxygen, as sodium perborate. Such preparations are quite effective cleaners and due to their bleaching action are sometimes effective stain removers. They should be used with **soft** water as outlined on page 10.

13. Liquid Soap

Liquid soaps usually consist of a solution of potash soap in water. They are convenient to use and are low in alkalinity, hence in marble cleaning where the mops come in contact with woodwork the varnish or paint is not so readily injured as by preparations containing more free alkali. After a long period of use the amber color of liquid soap is apt to cause a slight discoloration on certain marbles. The same precautions should be observed with a liquid soap as with other soaps in regard to softening the water and dampening the marble with clear, soft water before use.

14. Rinsing

In using any cleaning preparation it is important to thoroughly rinse the surface after scrubbing. If a scouring compound is used on the floor and a part of the grit is not removed, it not only accelerates the rate of wear under traffic but may produce prominent scratches. A film of soap or other slippery matter left on the surface may cause serious accidents. The importance of thorough rinsing is so evident and has been so frequently stressed that it hardly seems worth while to emphasize the point here. However, the research upon which many of the recommendations herein are based has indicated that the final rinsing is no more important than the preliminary dampening of the surface with clear water. Where this practice is followed the final rinsing can be more easily and more satisfactorily done.

15. Discolorations from Cleaning Preparations

Some cleaning preparations on the market have a distinct color. When such are used for a considerable period on marble of different color from that of the preparation some of the color may be imparted to the marble. This

statement refers only to the soluble part of the preparation. The color of scouring grits is of little concern, in fact a grit of different color from that of the marble is desirable since in that case one can more readily see when the rinsing is thoroughly done.

Particles of asphalt or similar matter which may be carried from the pavement to the marble floor contain a small amount of oil. Cleaning preparations which are of high alkalinity are apt to dissolve or emulsify some of this oily matter and carry it into the marble, thus causing a stain that is difficult to remove. Preparations containing a high percentage of carbonate or phosphate salts are much more apt to cause such stains than those consisting mainly of soap.

16. How to Soften Water

In large buildings where a considerable amount of soap is used in cleaning it may be found advisable to install a base-exchange silicate water softener. This consists of an apparatus placed in the main water line, causing the water to flow through a bed of silicates which remove the hardening elements. Where such method is not feasible, the following may be employed: Dissolve 12 ounces of ordinary household lye and four ounces of soda ash in four gallons of water and keep this as a stock solution for addition to the scrubbing pail. Fill a clean, scrubbing pail with the hard water in question. By means of a graduate add one ounce of the stock solution to the pail of hard water and stir thoroughly. Dip up a half pint or more in a glass vessel and into this dip a bar of pure white soap several times until a small amount of lather is formed. Examine the soapy water before a light to determine if any curdy-like particles have been formed. If such are noted more of the stock solution must be added. Increase the addition to the pail ounce by ounce, testing each time as above until the proper amount is ascertained. When the proper amount of the solution has been added, the water will readily form a lather with soap and no curdy particles will appear in the solution. The suds should endure for

several minutes without further addition of soap. The water should be hot, or at least fairly warm, else the softening will be less complete. Having determined the proper amount of the stock solution to add to each scrubbing pail, which will usually be not more than a few ounces, a cup or measure of this capacity should be obtained for use by the cleaning squad.

Trisodium phosphate is also a convenient material for softening water. This is purchased from laundry supply houses in the form of a white powder. In using this as a softener the stock solution should be made to contain a definite amount of the salt, as two pounds to each gallon. The amount of this stock solution required should be determined in the same way as for the lye and soda ash solution.

17. Frequency of Cleaning

It is not necessary to use cleaning preparations every time wall marble is washed down. Ordinarily clean water and clean rags are all that is needed. From time to time, however, it will be noted that this treatment does not leave the surface entirely clean and fresh. When this becomes apparent, then cleaning preparations should be used.



PART II.

TREATMENT OF STAINS



1. Iron Stains

IRON stains can usually be recognized by their resemblance to iron rust or by their position with respect to steel parts of the building.

Method No. 1—When the stain is not very pronounced it can usually be removed with sodium citrate and glycerin as follows: Dissolve 1 part of sodium citrate crystals in 6

parts of water. Add to this solution an equal volume of glycerine and mix thoroughly. Mix a part of this solution with whiting and work with a putty knife until a thick paste is obtained. Apply this over the stain in a layer $\frac{1}{8}$ inch thick or more. This will remain soft for a few days but when it becomes dry, replace it with a new layer or soften it by adding more of the liquid. Several repetitions may be required.

Method No. 2—For deep or intense stains it is more satisfactory to use sodium hydrosulphite ($\text{Na}_2\text{S}_2\text{O}_4$). Since this chemical is not generally carried by chemical supply houses the following producers are listed:

J. T. Baker Chemical Co., Phillipsburgh, N. J.
R. R. Street, 28 North Clinton St., Chicago, Ill.
Riverside Mfg. Co., Arcade Bldg., St. Louis, Mo.

The first firm sells the material under its true chemical designation as given above, while the second sells it under the trade name "Burmol," and the last under the name "Sulphogen."

As a preliminary treatment dissolve one part of sodium citrate in six parts of water and apply this to the stained marble by saturating a white cloth in the solution and pasting it over the stain. Leave this on the stain while the materials for the following treatment are being prepared. If the stained marble is in a horizontal position sprinkle a thin layer of hydrosulphite crystals over the stain, moisten with a few drops of water and cover with a thick paste made of whiting and water. If the stain is on a vertical face of marble place a layer of the whiting paste on a plasterer's trowel, sprinkle a layer of hydrosulphite on the paste, moisten slightly and apply it over the stain. Leave this on for one hour and remove. If the stain is not all removed, repeat the application. When the stain disappears, rinse the surface thoroughly with clear water and make another application of the citrate solution as in the first operation. The purpose of the sodium citrate treatment is to prevent the reappearance of the stain. The hydrosulphite treatment may dim the polish slightly. If

so, repolish by the procedure described on page 26. Occasionally in treating an iron stain with sodium hydrosulphite one may find that the original brown stain has been changed to black. If hydrated lime is used instead of whiting for the poultice this nearly always occurs. In case a black stain occurs it should be treated with hydrogen peroxide until it is oxidized back to the brown color, then proceed with the hydrosulphite treatment as described above.

2. Copper or Bronze Stains

Such stains are sometimes found on the marble bases of bronze statuary or where brass sign plates are attached to the marble. The stains are nearly always green, but bronze apparently causes brown stains in some cases. The green stains may be removed in the following ways:

Method No. 1—Mix together in the dry form one part of ammonium chloride (sal ammoniac) and four parts of powdered talc. Add ammonia water and stir until a thick paste is obtained. Place this over the stain and leave until dry. When working on polished marble use a wooden paddle to scrape off the paste. An old stain of this kind may require several applications. Sometimes aluminum chloride is used in the above procedure instead of the sal ammoniac.

Method No. 2—Dissolve 8 ounces of potassium cyanide in one gallon of water. Saturate a thick white cloth with the solution and paste it over the stain. When the cloth is dry, soak it again in the cyanide solution and repeat the operation. Sometimes it is advantageous to combine this and Method No. 1, that is, remove the greater part of the stain with the poultice and finish with the cyanide solution. The cyanide solution is very poisonous if taken into the system.

3. Ink Stains

There are several types of ink and, in general, stains from each type require a slightly different treatment.

Writing Inks—Make a solution of sodium perborate by dissolving 2 tablespoonfuls in a pint of hot water. Mix

this to a paste with whiting, apply a layer $\frac{1}{4}$ -inch thick over the stain and leave until dry. If some of the blue color remains, repeat the operation. If a brown stain remains, treat it by Method No. 1 for iron rust. Sodium perborate can be obtained from any druggist. Writing inks usually contain a considerable amount of acid, hence when spilled on marble the surface will be etched somewhat. Repolish if necessary, by method on page 26.

Synthetic Dye Inks—Many of the red, green, violet and other bright colored inks are water solutions of synthetic dyes. Such inks contain no acid and do not etch marble. Stains from this type of ink can usually be removed by the perborate poultice described for writing ink stains. Often the stain from such inks can be removed by a piece of cotton saturated with ammonia water placed over the stain. Javelle water (e) may also be effectively used in the same way. A mixture of equal parts chlorinated lime and whiting reduced to a paste with water and applied over the stain is also an effective treatment for this type of ink stain.

Prussian Blue Ink—Some blue inks contain Prussian blue, which is a ferrocyanide of iron. Stains of this type cannot be removed by the perborate poultice, Javelle water or chlorinated lime poultice. Such stains yield slowly to a treatment of ammonia water applied on a layer of cotton batting.

Indelible Ink—This type of ink often consists entirely of synthetic dyes and hence stains from such can be removed by the perborate poultice outlined above for that type. However, some indelible inks contain silver salts which cause black stains. They can be removed with ammonia water applied on a layer of cotton batting. Usually several applications have to be made.

India Inks—India ink consists of finely divided carbon held in suspension in a liquid by gums, shellac, etc. The

(e) Formula for preparing Javelle water is given on page 11.

carbon which forms the coloring matter does not penetrate marble but some of the minute particles may lodge in the uneven parts of the surface and prove very difficult to remove. If vigorous scrubbing with soap does not remove all of the carbon particles it will be necessary to use a mild grit and grind away part of the surface. Repolish if necessary by methods described on page 26.

4. Tobacco Stains

Method No. 1—The grit scrubbing powders are usually satisfactory for application to tobacco stains in the form of a poultice. Stir the powder into hot water until a mortar consistency is obtained. Mix this thoroughly for several minutes and apply it to the stained surface with a trowel in a layer $\frac{1}{2}$ inch thick. Leave this on until dry. Repeat if necessary.

Method No. 2—If the scrubbing powders called for in Method No. 1 are not at hand the following procedure may be used. Make up a soap solution by dissolving about 1 cu. in. of soap in a quart of hot water. In another vessel make up a solution of sodium carbonate by dissolving one large tablespoonful of soda ash to the pint of water or two tablespoonfuls of washing soda. Combine equal parts of these two solutions and apply a portion to the stained surface with a mop or saturate a piece of cotton batting in the liquid and place it over the stain for a few minutes. Make up a poultice by mixing a portion of the soap and soda solution with powdered talc or whiting. Apply this to the stain and leave until dry. Scrape it off as described on page 16 and repeat if necessary. Powdered talc is preferable to whiting since it holds the moisture longer and thus prolongs the action of the active chemicals. It also has the advantage of being easier to remove from the marble after it has dried. Whiting is apt to cling so firmly that it has to be moistened before it can be scraped off. This is an undesirable feature since the dried poultice contains the staining matter, and if it has to be soaked

loose from the surface some of the staining matter is apt to be driven back into the marble. If the paste is made of the proper consistency it can be applied with a paint brush, which makes the process easier in case a large area is to be covered. A whitening paste has the desired brushing properties, but in order to make the talc poultice work well as a brushing coat, it is necessary to add a little sugar. About one teaspoonful to each pound of talc will usually give the desired results.

Powdered talc in the raw state is of low cost but it is not always easily obtained. When only a small amount is required, one may employ the cheaper grades of talcum powders or purchase the unscented grades from automobile tire distributors. When a considerable quantity is needed, it will be better to order it by the 100 pound bag or by the barrel. It may be procured from talc or soapstone distributors in the larger cities or from the producers of such materials. The following list of distributors and producers can supply powdered talc at low cost:

- Georgia Talc Co.....Ashville, N. C.
- Hartford Talc Co.....Baltimore, Md.
- Rock Products Co.....Easton, Pa.
- Binney & Smith.....New York City
- Harshaw, Fuller & Goodwin Co., Cleveland, Ohio
- Wishnick-Tumpeer Chemical Co., Chicago, Ill.

Method No. 3—The following formula appears to be somewhat more efficacious than either of the two above: Dissolve two pounds of trisodium phosphate crystals in a gallon of hot water. Mix the contents of a 12-ounce can of chlorinated lime to a paste in a shallow enameled pan by adding water slowly and mashing the lumps. Pour this and the trisodium phosphate solution into a stoneware jar and add water until approximately two gallons are obtained. Stir well, cover the jar and allow the lime to settle. In using this on tobacco stains add some of the liquid to powdered talc until a thick paste is obtained, and apply as a poultice one-fourth inch thick with a trowel. If it is desired to apply this with a brush, add about one teaspoon-

ful of sugar to each pound of powdered talc. (See Method No. 2 above for list of talc producers.) When dry, scrape the poultice off with a wooden paddle. This mixture is a strong bleaching agent and is corrosive to metals, hence in using it, care should be taken not to drop it on colored fabrics or metal fixtures.

This formula is also valuable for use on other stains and will be frequently referred to in the following methods. Trisodium phosphate may be purchased at chemical or laundry supply houses.

5. Urine Stains

Use Method No. 3 as outlined above for tobacco stains. Some parts of the stain may prove stubborn, in which case saturate a layer of cotton batting in the liquid and paste over that part of the marble. Resaturate the cotton if necessary.

When polished marble has long been exposed to the action of urine the polish will usually be injured. Repolish by method described on page 26.

6. Fire Stains

Often in the case of fires the marble is not appreciably injured but may be badly discolored from the smoke or pitch from burning wood. Sometimes it is entirely feasible to restore the original appearance by the following process: First, scour the surface with powdered pumice or a grit scrubbing powder to remove the surface deposit, then make up a solution of trisodium phosphate and chlorinated lime as described above in Method No. 3 for tobacco stains. Fold a white Canton flannel cloth to form 3 or 4 layers and saturate it with the liquid. Paste this over the stain and cover it with a piece of pane glass or a scrap slab of marble, making sure the cloth is pressed firmly against the marble. Resaturate the cloth as often as necessary. Bad pitch stains are difficult to remove and hence several treatments will be necessary. Repolish if necessary by method described on page 26.

7. Lubricating Oil Stains

Lubricating oil penetrates quite readily and if accidentally dropped on the surface of marble it should be mopped off with a cloth and covered with fuller's earth or other dry powdered material such as hydrated lime, whiting or Portland cement. Oil that has penetrated may usually be removed in this way if treated soon after the stain occurs. However, when the oil has remained on the marble for a considerable period of time and thoroughly oxidized it will prove very difficult to remove. Such stains can usually be removed as follows:

Method No. 1—Cut a piece of white Canton flannel somewhat larger than the stain and saturate it in a mixture of equal parts of acetone and amyl acetate. Place this over the stain and cover with a piece of pane glass or preferably a small slab of marble. If the stain is on a slab of marble in the wall it will be necessary to improvise a means of supporting the cloth and its covering in place. When the cloth becomes dry, it should be again saturated and covered as at first. Old oil stains are difficult to remove and their treatment may require a great deal of patience. The solvent may spread the stain somewhat, in which case a larger cloth should be used. In covering the saturated cloth with a piece of glass the stain is driven into the marble, while if a dry slab of marble is used instead of the glass, some of the oil will be drawn out into it.

Method No. 2—A method frequently used in marble mills consists in mixing a solvent such as benzol or gasoline with a dry powder to form a paste which is plastered over the stain. Hydrated lime, marble dust, whiting or similar material may be used for this purpose. While this method is said to be satisfactory for such oil stains as occur around the mills, it is rather slow to produce results on old oil stains which have dried and oxidized. In the mills the marble is apt to be full of "Quarry sap" or water used in the fabricating processes, hence oil accidentally dropped on the surface does not penetrate to the same degree as in the thoroughly seasoned marble in buildings.

Method No. 3—Lubricating oil stains can be removed with more facility where the following method can be used: Place a layer of asbestos fiber about $\frac{1}{4}$ -inch thick over the stained portion, saturate it with amyl acetate and cover with a scrap slab of marble. Place on top of the auxiliary slab a hot iron of about the temperature used for pressing fabrics. Apply more amyl acetate as the asbestos becomes dry and reheat the iron as often as necessary. A few layers of Canton flannel may be used instead of asbestos fibre if care is taken not to scorch the cloth. Stains from scorched cloth may be removed by the same method recommended for fire stains, on page 21.

8. Linseed Oil Stains

This type of stain is usually found around plumbing fixtures where putty has been used. The linseed oil from putty may spread for some distance through the marble and produce a stain that is very difficult to remove. The oil in oxidizing forms a resinous matter which practically seals the pores and effectively prevents the penetration of any solvent which may be applied. Method No. 1 recommended for use on lubricating oil stains will slowly dissolve this resinous matter and reduce the stain. It is sometimes satisfactory to bleach the coloring matter in such stains as follows:

Method No. 1—Cut a piece of thick white cloth or a layer of cotton batting to fit around the fixtures. Saturate this with hydrogen peroxide and paste it over the stain. The bleaching action may be accelerated by moistening another cloth in ammonia water and placing this over the first. Repeat the operation as described until the discoloration is removed.

Method No. 2—Mix together in the dry state the following: One part trisodium phosphate, one part sodium perborate and three parts powdered talc. Make a strong soap solution in hot water and add enough of this to the dry mixture to form a thick paste. Cover the stain with the paste and leave until dry. The same material can be used

over again by reducing it to a paste with more of the soap solution. In some cases it may be found desirable to alternate this treatment with Method No. 1 for lubricating oil stains on page 22.

Method No. 3—Combine equal parts of wood alcohol and a solution of trisodium phosphate made by dissolving $\frac{1}{2}$ lb. to the quart of water. Make a paste of this mixture and asbestos fibre sufficient to cover the stain with a layer $\frac{1}{4}$ inch thick. Place a scrap slab of marble over this and apply a hot iron as described in Method No. 3 for lubricating oil stains, page 23. A few repetitions of this process may be necessary in cases of very pronounced stains.

9. Rotten Wood Stains

Marble setters sometimes place excelsior behind slabs of marble. Under damp conditions the excelsior will rot and finally cause a chocolate-colored stain on the marble. It seems entirely possible that wood in the framework of buildings might sometimes cause similar stains. This type of stain is readily distinguished from most other stains by its color or position, it being of a much darker color than that due to iron rust or tobacco. The best treatment found for this type of stain is that recommended for fire stains. The action may be accelerated by first scrubbing the surface thoroughly with glycerine diluted with four times its volume of water.

10. Coffee Stains

Coffee stains can be removed by saturating a cloth in glycerine diluted with four times its volume of water and pasting it over the stained portion. Javelle water or the solution used on fire stains, described above, will also prove effective.

11. Iodine Stains

This stain will gradually disappear of its own accord within a few weeks. It may be removed by applying alcohol and covering with whiting or talcum powder. If

the stain is on a vertical wall, mix the talcum to a paste with alcohol, apply some alcohol to the stain and then cover it with the paste.

12. Barium Sulphide Stains

This chemical and other alkaline earth sulphides may be present in preparations used for removing superfluous hair. When dropped on marble such compounds sometimes leave a yellow sulphur-colored stain. This may be removed by applying a weak solution of potassium cyanide. Dissolve a teaspoonful of potassium cyanide in a glass of water, saturate a piece of cotton batting with the liquid, paste it over the stain and leave until dry. One or two applications will usually suffice. The cyanide is poisonous if taken into the system.

13. Perspiration Stains

Secretions from the hands or oil from the hair may produce stains on marble in certain parts of the building. The stain is yellow and may be mistaken for an iron stain. The best treatment found for such is that recommended for fire stains. Deep stains of this kind are rather stubborn and may require several treatments.

14. General Service Stains

Marble work which has become soiled or dingy from various causes or from lack of an occasional cleaning, may often be satisfactorily cleared up by scrubbing with Javelle water as described on page 11. Stains which do not yield to this means will usually require a poultice treatment. Poulticing with grit scrubbing powders as described for tobacco stains will usually be found satisfactory in such cases.

Since such discolorations are apt to cover considerable area it will be found more expedient to use a poultice that can be applied with a brush instead of a trowel. That described in Method No. 3 for tobacco stains is well adapted for this purpose.

PART III. SPECIAL TREATMENTS FOR MARBLE



1. Polishing Marble

IN the mill, marble is polished by means of a buffing disc fitted with felt pads. This disc is power driven and can be moved over the surface of a slab as desired. A small amount of water is used in this process and polishing powders are fed to the disc in the dry form.

Before the slab is brought to the polishing table it has to be finished to a very smooth surface by grinding with various grades of abrasives. The last stage before polishing is called the hone finish, which is slightly glossy.

It may be found desirable in some cases to repolish certain parts of the marble work in buildings where they have lost the finish due to cleaning processes or other causes. The procedure in such cases may have to be varied somewhat, due to the character of the surface. In cases where the polish is only slightly marred all that will be necessary is to buff the surface with a cloth or chamois skin and some polishing powder. Moisten the cloth, dip it into the polishing powder and rub the surface vigorously until the desired polish is obtained. Polishing powder, or "putty powder" as it is usually called, can be obtained from marble setters. Where a considerable amount is required, it may be found desirable to order it from a manufacturer of such products, as the Harrison Supply Co., of Boston, Mass., or James H. Rhodes & Co., 28th St. & Albany Ave., Chicago, Ill. Where the polish has entirely disappeared and the surface presents a dull or slightly rough appearance, it will be necessary to buff it with a fine abrasive before using the polishing powders. Emery flour or No. 220 carborundum may be used for this purpose. Where a considerable area is to be polished, it is better to get a marble concern to send a skilled man to do it. It requires considerable skill to produce good results.

2. To Prevent Stains from Iron

Where moisture may have access to steel parts of the building and then to the marble, the marble is apt to be discolored. The following treatment will render the marble practically immune to such stains under ordinary conditions: Dissolve one part of sodium citrate crystals in six parts of water and apply the solution to the marble with a brush. Marble slabs which are to be placed adjacent to steel door frames, or other steel parts, should be treated by this process on the edge and back before installation.

3. To Prevent Stains from Putty

Where pipes are carried through marble slabs it is customary to fill in the excess space around the pipe with putty. In such cases the linseed oil from the putty is apt to cause a stain which is very hard to eradicate. A treatment of the marble before placing the putty which will usually prevent the oil from penetrating is as follows: Apply two or three coats of commercial waterglass to the inside of the hole through the marble with a small brush. Commercial waterglass is a thick syrupy liquid. For the first coat it should be diluted with twice its volume of water. The second and third applications should be made with the liquid in its original state. Ample time should be allowed for each application to dry.

It is best not to use putty at all. Grafting wax is frequently used instead of putty for this purpose. It does not stain marble and is easily removed in case the piping has to be changed.

4. To Waterproof Marble

Under certain conditions of exposure it may be found desirable to apply a treatment to the backs of marble slabs in order to prevent penetration of moisture or various liquids. Bituminous coatings are frequently used for this purpose. A treatment which appears to be more durable under most conditions, consists of paraffin applied either in the molten condition or in solution. Usually a more

satisfactory seal can be obtained by heating the marble surface somewhat above the melting temperature of paraffin, applying the wax in a molten condition, then driving it in by further application of heat. Where marble slabs are to be exposed to continual dampness, as on a damp wall, this is probably the best treatment to use. Under such conditions as arise in soda fountain counters where various solutions may be splashed against the back of the marble, it will usually be found satisfactory to paint the back of the slab with two or three coats of a solution made by dissolving 10 ounces of paraffin to the gallon of benzol or light gasoline. The easiest way to dissolve the paraffin is to melt it and pour it into the solvent. In making a solution of this kind care should be taken to avoid igniting the solvent. Paraffin melts at a temperature considerably below the boiling point of water and if it is not heated longer than is required for melting there will be no danger. To be entirely safe, one may remove the molten paraffin from the heat and allow it to stand until it starts to congeal before pouring it into the solvent. The marble should be perfectly dry and a few hours should be allowed for each application to dry. Better results will be obtained if the marble is warm when the application is made. These paraffin treatments are not well adapted to general use on the exposed surface of marble work since discolorations will be caused on light-colored marbles.

5. Treatments for Exterior Polished Marble

Such marbles as "Black and Gold," "Belgian Black" and "Verde Antique" are frequently used in store fronts where the polished surface is exposed to the weather. After a period of exposure the polish is marred and the marble loses much of its original appearance. Repolishing, in most cases, will entirely restore the marble to its original condition, but frequently a more economical treatment is desirable. A treatment which has been used to some extent for this purpose consists of waxing the surface with a

mixture of two parts beeswax and one part turpentine. The mixture is conveniently made by melting the wax and pouring in the turpentine. This results in a mixture of about the same consistency as lard. This is rubbed over the marble surface with a cloth and the excess removed with a fresh cloth. The surface should then be thoroughly rubbed with a piece of canvas until the gloss appears.

A limited amount of research on treatments for store front marble has indicated that other wax treatments may be used with equal or somewhat better results than the above. Equal parts of beeswax and Carnauba wax reduced to a soft condition with turpentine and applied in the same manner as the beeswax treatment described above has given good results in the laboratory tests. A solution made by dissolving one pound of paraffin to the gallon of benzol has also indicated satisfactory results when the marble surface is heated somewhat above the melting point of paraffin before making the application. A convenient means of heating the marble surface is to employ a gas or electric heat reflector such as are in ordinary household use. This type of heating apparatus can be set up in front of the marble to be treated and left in one place until that part of the surface is hot enough to melt the wax when applied to the marble. Then while the hot portion is being treated, the heater can be used for heating an adjacent portion of the marble. The excess wax should be thoroughly wiped from the surface, which is then buffed with a piece of canvas. No very satisfactory study has been made to determine how often such treatments would have to be renewed, but it seems probable that the paraffin treatment would prove more durable than the other wax treatments described.

A very thin spirit varnish made by dissolving one part of rosin in three parts of wood alcohol appears to be a fairly satisfactory treatment for marble that is not subjected to severe exposure. This coating is apt to discolor if it is kept wet for a few days at a time by rains. This varnish treatment should be applied with a camel hair brush in a thin uniform coat. No buffing is necessary, hence, this treatment requires very little expenditure of time.

GENERAL RECOMMENDATIONS

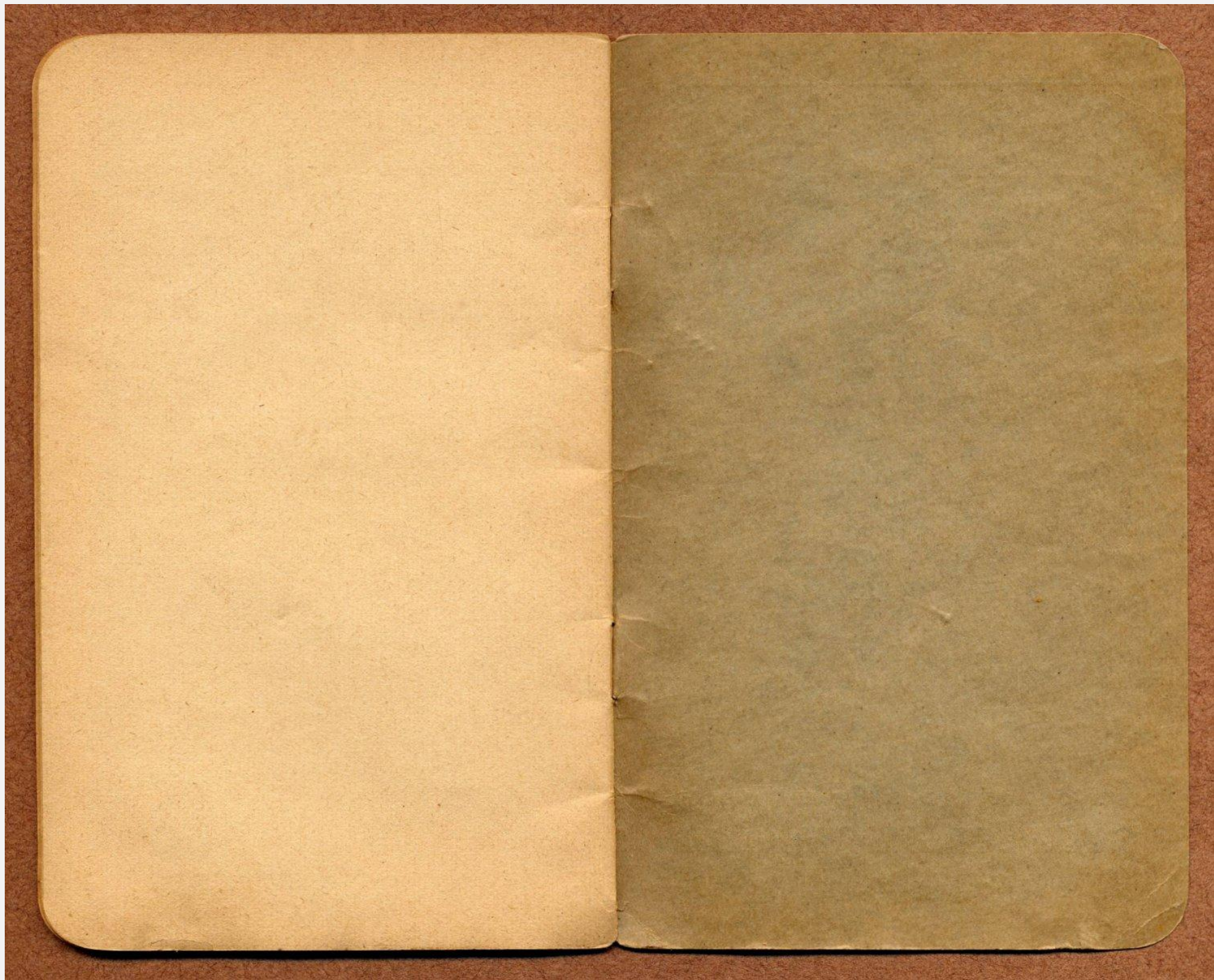


1. Usual types of scouring grits are generally satisfactory for use on marble floors, but most preparations of the scouring type contain salts which may prove injurious.
2. Before using a scouring grit or a preparation of the scouring type on marble work of finer finishes than that of floor tile, one should test the effect on some inconspicuous part of the marble, as described on page 7.
3. In using scouring grits on marble floors or steps, one should use reasonable care in rinsing the grit from the surface, since small amounts of such material increases the rate of wear under foot traffic and coarse particles are apt to produce scratches.
4. When scouring grits are used on marble floor tile in buildings which have polished marble in the base of the wall-work, the grits are apt to mar the polish where the mops are pressed against the base slabs.
5. Due to the fact that scouring preparations are apt to be wrongly used by the cleaning force on the polished marble work where such preparations are employed on the floors, it becomes evident that a scouring grit of a softer mineral than those commonly used is desirable. Crushed soapstone or talc seem to answer these requirements and due to their cheapness and availability they seem to afford a desirable substitute for the present hard grits.
6. Due to the fact that such alkaline salts as sodium carbonate, sodium bicarbonate, trisodium phosphate or ammonium carbonate may prove injurious to marble after a considerable period of constant use, it seems advisable to use such detergents or preparations containing these

salts only occasionally. Wherever it is deemed necessary to use such detergents follow the procedure outlined on page 9.

7. A pure white soap, if properly used, will meet most cleaning requirements and prove to be the safest detergent for use on all marble finishes. For methods of use, see page 10.
8. Cleaning preparations which give a distinct color when dissolved in water may gradually discolor marbles of different color from that of the cleaning solution.
9. Thorough rinsing is important and should receive careful attention. The preliminary dampening of marble with clear water is advisable in practically all cases.
10. For removing stains from marble, methods have been developed which are practically free from injurious effects. While special cases may demand slight variations in the procedures given, the basic methods are believed to be applicable to all ordinary conditions of staining.
11. Repolishing of certain parts of the marble work may sometimes be desirable. In such cases the procedure on page 26 is recommended.
12. Under certain conditions pre-installation treatments for marble may be desirable. Methods of preventing iron stains, linseed oil stains, etc., are described in Part III.





Ozark Gray Marble



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Carthage Marble Corporation

Carthage, Missouri

**Maintenance of
Interior Marble**

By

D. W. KESSLER, *Research Associate*
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