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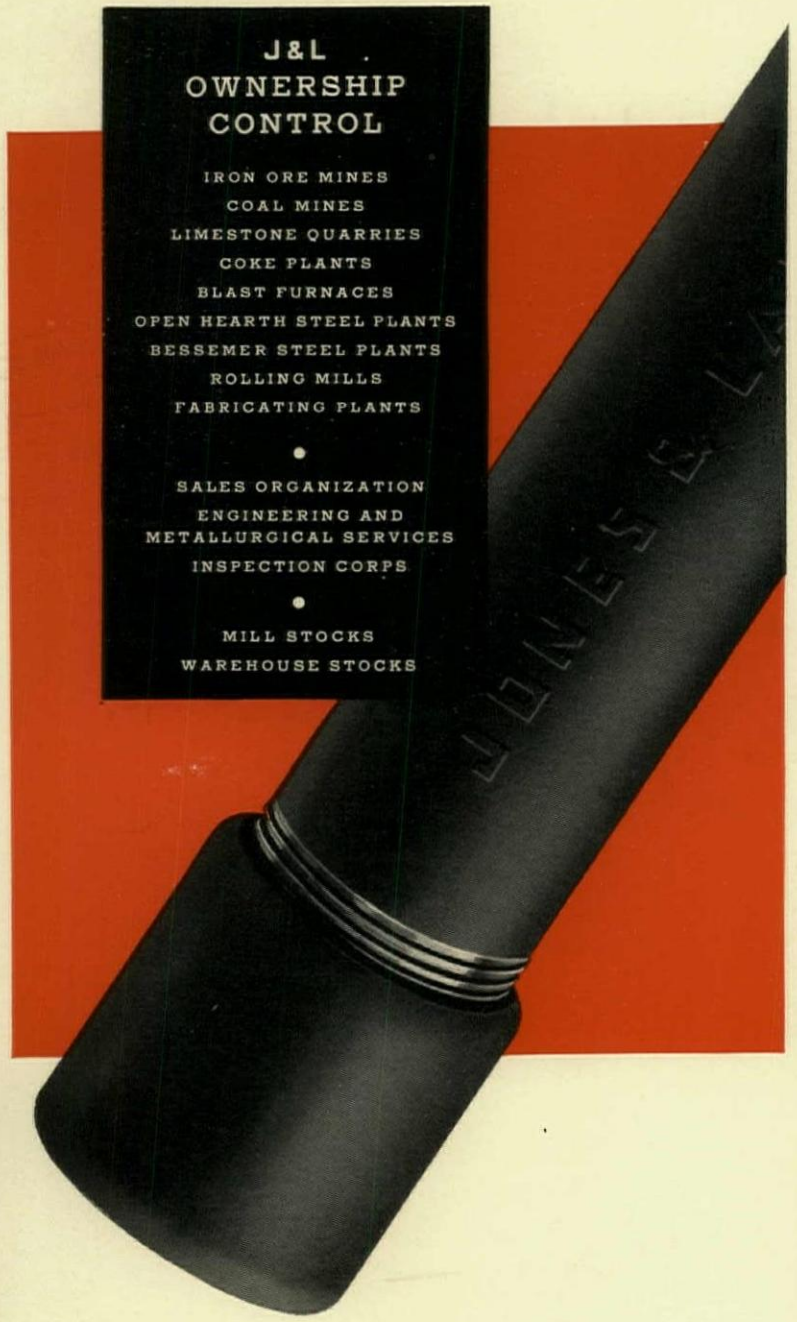

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PENCIL POINTS

Volume XIV February, 1933 Number 2

The Budget Fetish and Public Works

Doubt is being expressed by leading economists, ever more often and emphatically, as to the necessity or advisability of laying so much stress on balancing the current Federal Budget. Virgil Jordan, Economist of *The Business Week*, pointed out not long ago that:

"Those who so ardently urge a balancing of budgets and curtailments of public expenditures during depressions are gluttons for punishment, for they, in the last analysis, must pay the price either in increased taxes or diminished income. They may imagine that they can pass it on or spread it out through consumptive taxes, but they are mistaken, for sales taxes levied to help pay interest to public bondholders ultimately come out of capital and profits in the form of lower business volume. So long as so large a part of the public liabilities are fixed and sacred as debts and armaments are, deflation of public expenditures is bound to be one-sided and to let the wind chiefly out of business and its customers. The process is apparently endless also; for every time the purchasing power of public employees is reduced, the tax-paying power of business concerns and real-estate owners is curtailed and further economy becomes necessary. In fact, except for debt charges, there can be no reduction of public expenditure which does not curtail private expenditure and therefore tax-paying capacity in an ever-widening circle."

To us, this seems like clear common sense.

Such organizations as the National Economy League and the National Committee for Economy in Government formed by the National Association of Manufacturers are vigorously prosecuting a campaign to reduce government expenditures. So far as their programs are aimed at the elimination of graft and waste, we are with them, but when they advocate cutting down on legitimate government expenditures in the public service and urging reduction of the public works program, rather than an increase, almost vital in a depression, they seem to us very short-sighted. Their proposal is like advising amputation of an arm as a cure for a broken leg. Buying power of a large portion of our economic organism is seriously crippled. The remedy is emphatically not to cut it off in another place.

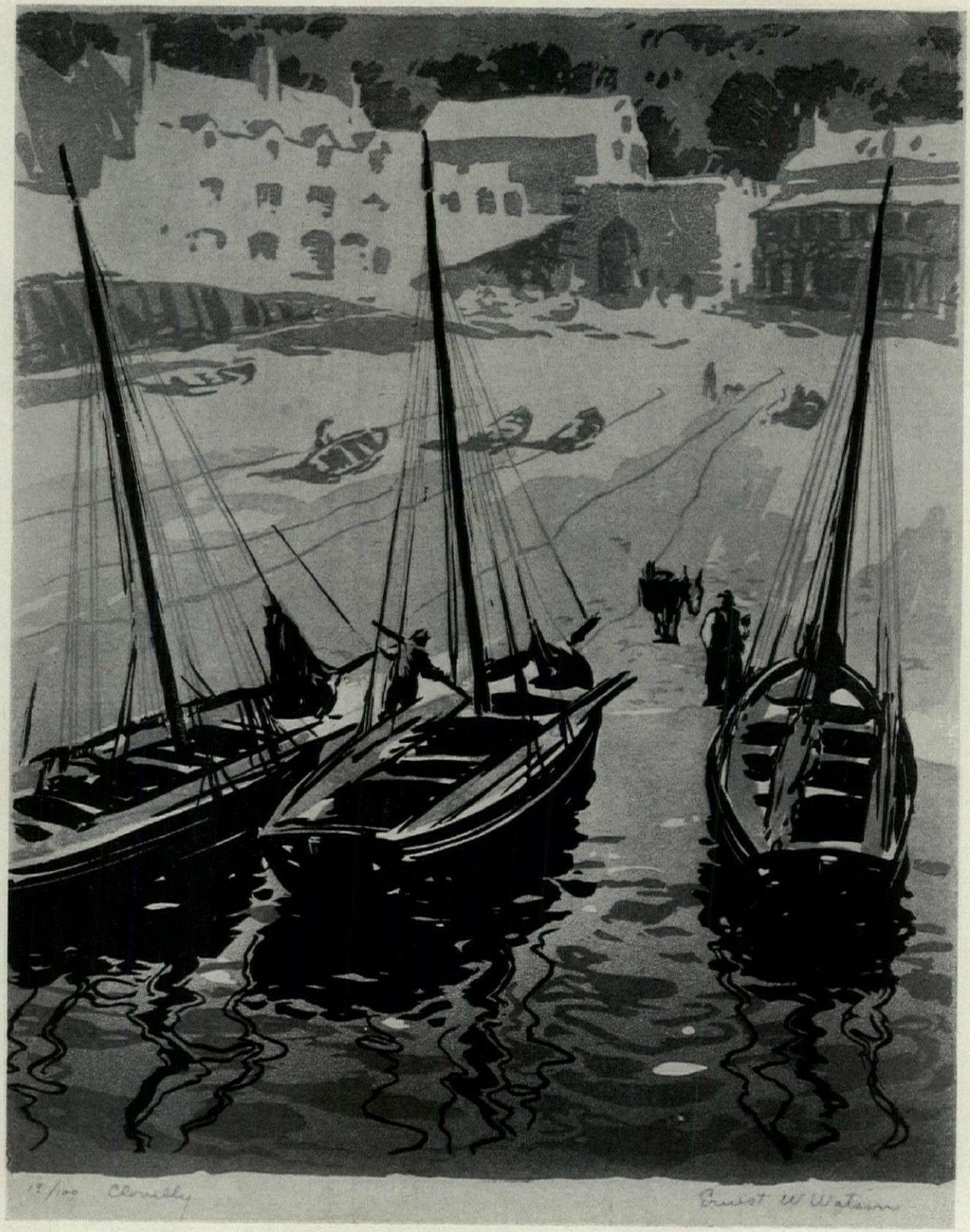
There is more government and bank currency extant in this country now than at the height of the boom in 1928-29. The difficulty is that it is not moving. People are not spending it. Business is not spending it. They may not have it or they may be afraid to spend it lest they have none tomorrow. The fact remains that, for whatever reason, it is not circulating. In the face of a condition like that should we not be thankful that the spending power of the government is still there, that we can as a whole people still keep a large volume of money at work paying wages and buying goods and services?

Individuals cannot be blamed for hesitating to spend now. Business seemingly cannot be either persuaded or coerced into spending. The long extended effort of the Federal Reserve System to force money out of the banks and into circulation—in other words the attempted inflation of credit—has been ineffective. What means is there then left, other than government spending, to bring about the accelerated consumption necessary to make the wheels go around again?

It is pretty generally accepted that production is so well organized that it can easily take care of more than our needs—the emphasis now turns to consumption. If we cannot or will not consume effectively as individuals or as businesses, should we not be willing and even eager to consume collectively as a nation?

We are not advocating a permanent and perpetual increase in the rate of government spending, to be carried on year after year in depressions and booms alike. It seems sound, however, to use the spending power of the government as a balancing force, to be applied vigorously in depression times and held back in times of prosperity.

Looking at the Federal budgeting system from a little longer point of view it is interesting to note that it has been operating since 1921 and that during the period 1921-1930 government revenues exceeded expenditures by over three billion dollars. Not only that but the government debt was decreased during that time by almost eight billions. Even if the deficits of the past three years up to June, 1933, should reach as much as five billions we should still as a nation be almost six billions ahead of our position in 1921—and no one questioned our credit then. Neither should anyone question it now, whether the budget be balanced today or not. We have the natural resources, the manufacturing equipment, and the man power to balance it tomorrow. For today our problem is to organize and stimulate consumption. The government, by means of a large and immediate increase in public works expenditures, is the only agency that can lead the way with any hope of adequate results.



"CLOVELLY"—FROM A COLOR BLOCK PRINT BY ERNEST W. WATSON

The original print measures 8½" x 10" and was printed from five blocks, some of which were inked with two or more colors. A total of ten different pigments was used.

The Work of Ernest W. Watson

A Word of Appreciation and Some Technical Notes

By Rayne Adams

Editor's Note:—*This article was written just before the author's untimely death a year ago last April. Its publication at this time may revive memories of the man himself among his many friends in the profession and of his many valuable and interesting contributions to* PENCIL POINTS *among readers who were not fortunate enough to know him in person.*

While his mastery of color as evidenced in his block prints constitutes, perhaps, Ernest Watson's chief claim upon our interest, it is proper to remark that it is nevertheless only one of the mediums in which he has manifested his talent. And since this mastery is the fruit of long years of study it is proper also to note, in order to locate Watson in terms of space and time, something in the way of biographical note. He was born in Conway, Mass., and he spent his early student days at the Massachusetts School of Art and at Pratt Institute in Brooklyn. It need hardly be said that his subsequent period of travel abroad and the many years following in which he taught drawing and block printing at Pratt Institute constituted only a continuation of his own studies. He has given much time to pencil illustration and an example of his work with this medium is shown in this issue. Such drawings as this speak in the language of the drafting room and they tell their own story. His linoleum block cuts, however, while they need no comment to point out their admirable qualities, involve a special process in their making—and in order to understand them with any completeness one should understand the way in which they are made.

EXAMPLE OF A WOOD ENGRAVING BY TIMOTHY COLE

In which tones are produced by controlling the relative widths of the white lines and the intervening spaces.

It is so normal a thing for the draftsman to think of drawing as a direct process that the indirect process of engraving carries with it certain elements of mystification. We are so much in the habit of drawing with pencil, pen and ink, or charcoal, that it wrenches us a bit to think in terms of grooves and relief surfaces from which prints may be obtained. In connection with the admirable block cuts of Ernest Watson, it will not be amiss to make clear just what a linoleum block is at the outset. For a technological process is involved and technological processes are troublesome. To understand them means that not only has one to be able to "bear the pain of thinking" but he will rarely understand them unless he actually "goes through the motions" himself.

In approaching the subject of engraving, it is permissible to present an analogy which will be found in the experience of many. To one to whom English is a native tongue, his introduction to the study of German is a revelation. I recall in my own experience that the first six chapters in the grammar seemed easy; it was so much like English. Then, suddenly, I became aware that by the magic of grammar, the word order was quite different and that it became necessary to hold in suspension a lot of phrases and clauses until one came upon a cluster of verbs at the end of the sentence which, provided you had succeeded in holding the phrases and clauses in suspension successfully, suddenly precipitated their significance.

The situation is not so different with respect to engraving when it is approached by one innocent of any method of graphic representation except the direct one. The beginning of the subject is not difficult to understand; but when the use of color in connection with block cutting is introduced, the whole subject takes on a technological character which may be understood only by practice.

To begin with, it is worth while to clear away certain misconceptions concerning the use of linoleum as a material for engraving. The predicament of linoleum is somewhat similar to that in which the so-called "baser" metals find themselves. Historically, gold and silver have always been considered in the arts as being, in some way, superior to, let us say, iron. And

yet, what collection of gold and silver objects could rival in æsthetic interest the amazing collection of "ferronerie" which one may see in the *Musée le Secq des Tournelles* at Rouen and which has been made generally familiar to architectural draftsmen in the two volumes in which the contents of this museum have been so admirably reproduced? The distinction between the "higher" and "baser" metals, like the distinction made between wood and linoleum in their relation to engraving, is wholly invidious. Linoleum, as is well known, first made its way into public consciousness as a material for floor covering. It is a strange commentary on the habits of thought that the fact that it serves this purpose adequately should somehow react unfavorably upon its use as a material for engraving. Yet, had it first been used as a material for engraving, its subsequent usage as a covering for kitchen floors would have seemed a sort of degradation. Moreover, it suffers from the unhappy misconception that it offers a possibility of making printing blocks inexpensively and easily, and that for this reason it is somehow inferior to wood. Of course, to the judicious, no comparison will be made between the two materials save to note that each in its own field has special possibilities and limitations.

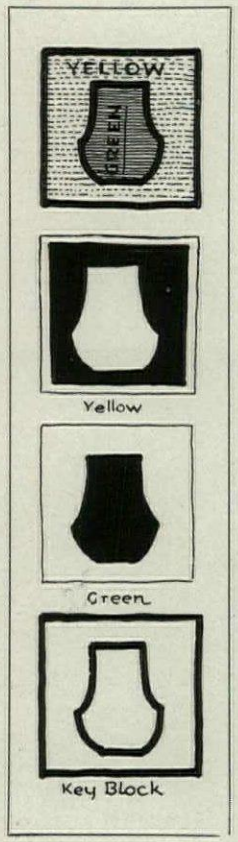


FIGURE 1

Whatever these special limitations may be, the elementary woodcut and the linoleum block cut have much in common with respect to the method of their making. And it is easiest, I suppose, in describing this method, to deal with it as exemplified in the making of woodcuts. At the risk of digging up bones with which you are familiar, I am going to preface the summary of linoleum block cutting by stating that all engraving falls essentially into one of two classified processes, exemplified by the copper plate engraving and the woodcut. In the first, the lines which show in the print correspond to *indentations* in the surface of the plate; in the second, the surfaces which transmit the ink to the paper in the process of printing are left *raised*, by the cutting away of the material adjacent to them. The linoleum block cut belongs to the latter category. Yet, there is a difference between the "woodcut" and the "wood engraving," and it is necessary to note it in order to show the essential character of the linoleum block cut. The earliest masters, such as Dürer, made "woodcuts." The "wood engraving" was not developed until the very end of the 18th century, notably by Bewick. And it may be noted that in the typical woodcut, such as those made by Dürer, the cutting was done on the "side grain" of the wood; in the wood engravings made by Bewick, the engraving was done on the "end grain" of the wood.

The wood engraver can carry his tool across the end grain of his block in any direction with equal ease. Furthermore, his engraved lines can be very fine, mere scratches on the polished surface of the end grain wood block, and spaced so close together as to produce the effect of tones. Tones of any desired values can thus be produced by controlling the width of the white lines and the intervening spaces. The Timothy Cole engraving herewith illustrated demonstrates this point clearly.

And this brings us to an understanding of the limitation of linoleum. The thin bridges, which can be engraved on the end grain of the wood block, cannot be successfully cut in linoleum. The material will not "stand up." And, in consequence, the linoleum block finds its proper sphere in being considered not as an engraving, but as a cut.

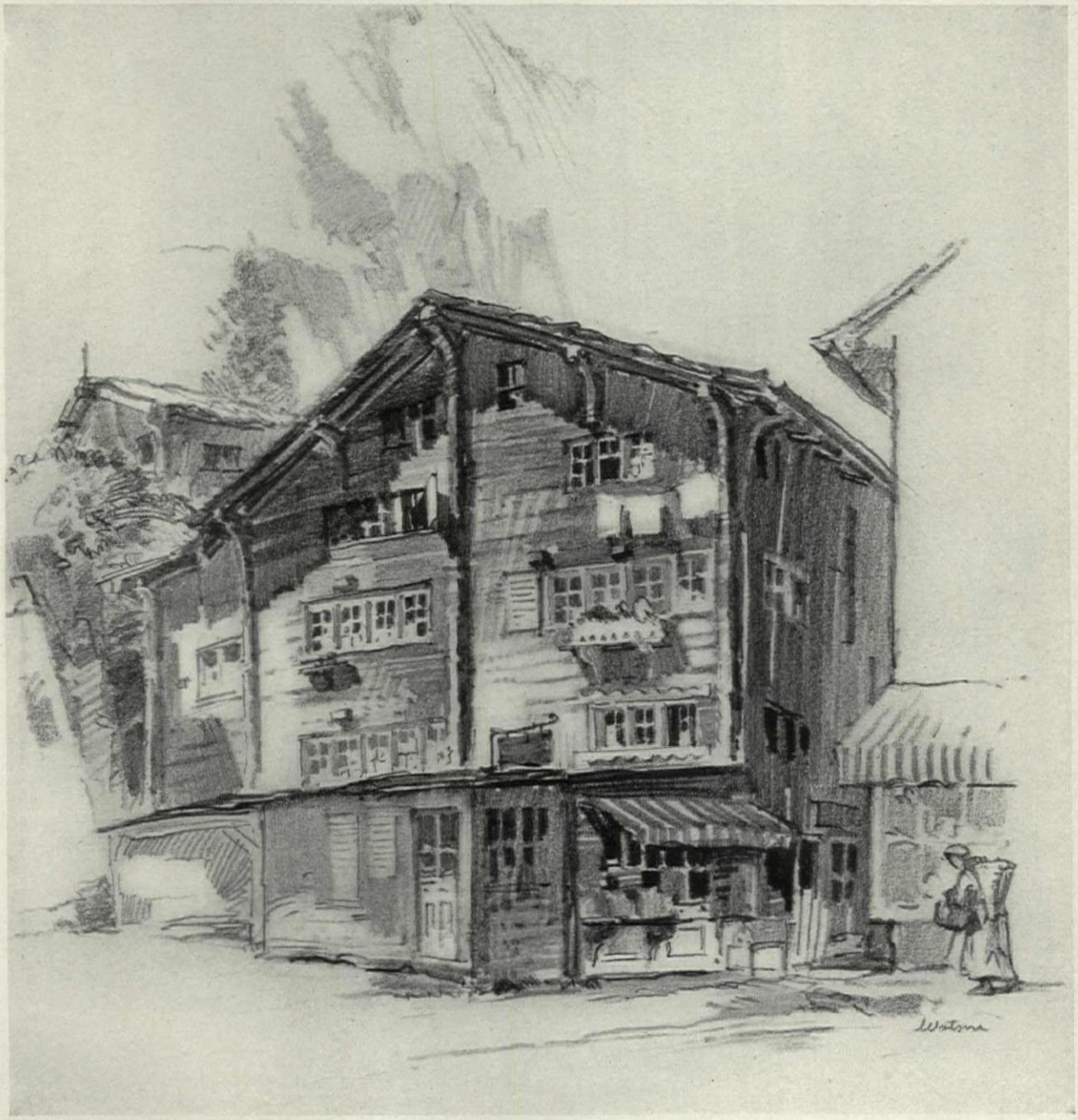
Linoleum, then, is primarily a material which lends itself to broadly conceived masses; not to fine outline work, nor to tonal work. In this special field it is superior to the wood block because of the relative ease with which it is worked, giving, as it does, results that are quite as good as those obtained by the latter.

In printing in black or white or monotone, it is obvious that only one block is required. In carving this block, the general method is as follows: The linoleum is usually mounted on heavy cardboard, and its surface scraped with a razor blade and thus brought to a glass-like finish. The design may be indicated directly on the block by use of brush and India ink, or it may be transferred (i.e., offset) by means of carbon paper, or by direct transfer through the use of a hand press. The cutting of the block may be done with a common knife, as was done by the old woodcutters, but in the generality of cases a gouge or a veiner is used. (A veiner is a wood carving tool, the cutting edge of which is a U or a V.) When the block is cut, it is inked by means of a printer's brayer (roller), placed in the press and printed. That, in outline, is the simple method involved.

It is in using various colors in printing that the process becomes complex and it is a process that calls for patience and experience. Essentially, the process is the same as that described for monotone printing, though it involves several distinct steps. It is necessary to decide first upon the color scheme, and secondly, to make, in succession, blocks which will carry only a particular color in the printing process. The steps, in outline, are as follows: Suppose the drawing be an utterly simple one like that shown in Figure 1, in which the design is carried in black, the body of the vase green, the background yellow. Transfer this drawing to a linoleum block and cover the outline carefully with India ink. Then cut away those portions of the surface not covered with ink. This gives the "key" block. Transfer an impression taken from the "key" block to a fresh block intended to print

the yellow background. Paint the background area with India ink, and cut away those portions of the surface not covered with ink. This completes the yellow block. Repeat the process for the green block. Print the yellow block, then the green block, and finally, the black or "key" block.

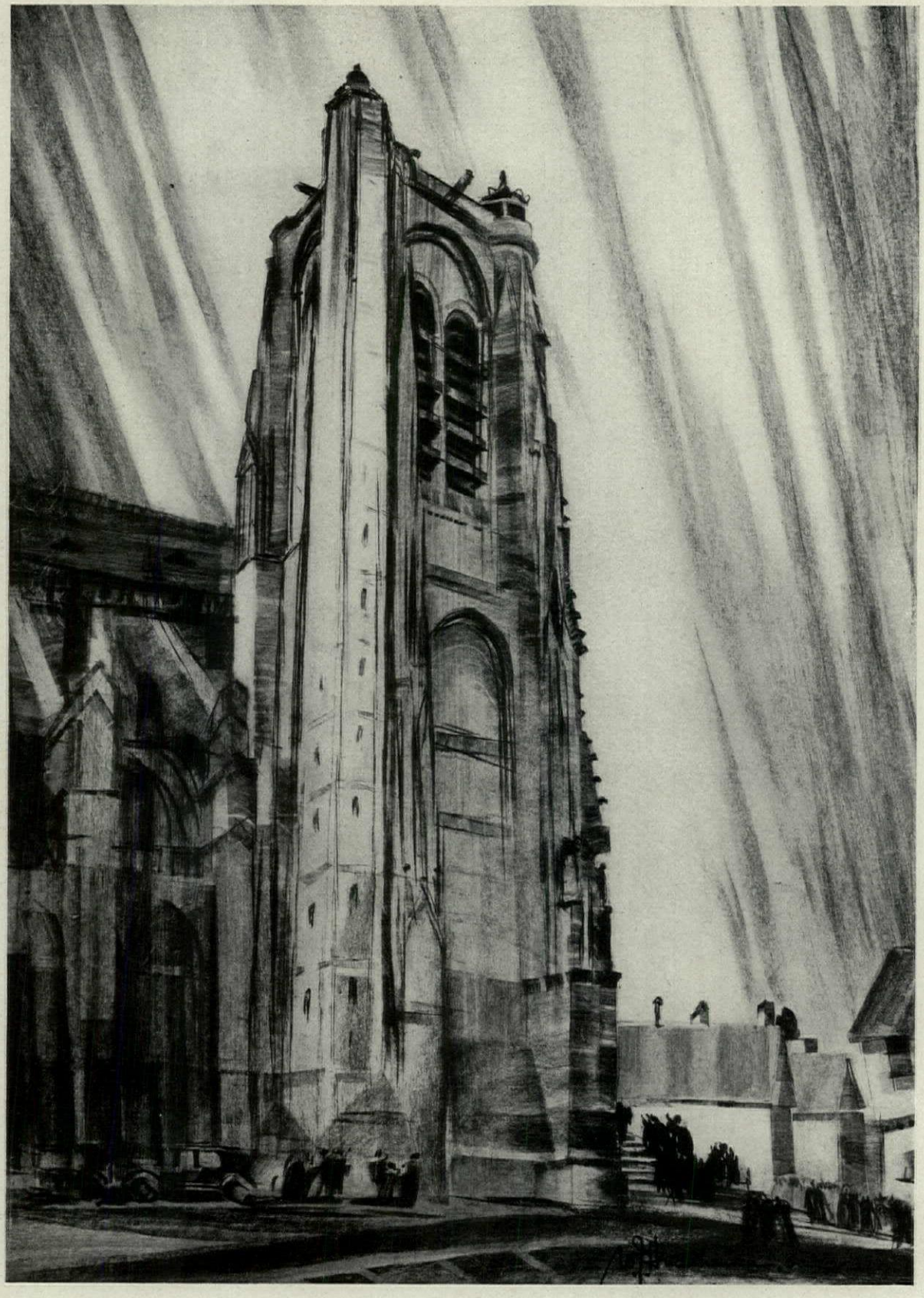
It seems simple enough, in this bald summary, but the intricacies of craftsmanship are considerable. Most important of all considerations is the exactness with which the transfers from the key block are made, because it is essential that the design be transferred to each block in such a way as to insure proper "register." There are various means by which this proper registry is obtained, but for a discussion of these the reader may properly be referred to the text of Ernest Watson's own book on the subject. Such a bare outline can only suggest in a most elementary manner the process by which Watson obtains his marvellously intricate color patterns. In using a black "key block" the process is made relatively easy; it is in such designs as that shown on the frontispiece, where there is no black "key" block, and where delicate gradations are introduced with one color superposed over another, that a profound knowledge of the technique of cutting and printing is involved. But enough has been said to suggest the ways in which these magical effects are achieved; the rest must be left to be discovered by those who, interested in making linoleum block prints in color, shall find through trial and error the ways and means to achieve success.



AN OLD SWISS CHALET AT ZERMATT

FROM A PENCIL SKETCH BY ERNEST W. WATSON

This drawing was made on kid finish Bristol board and measures, in the original, 7½" x 8⅛".



THE NORTH TOWER OF BOURGES

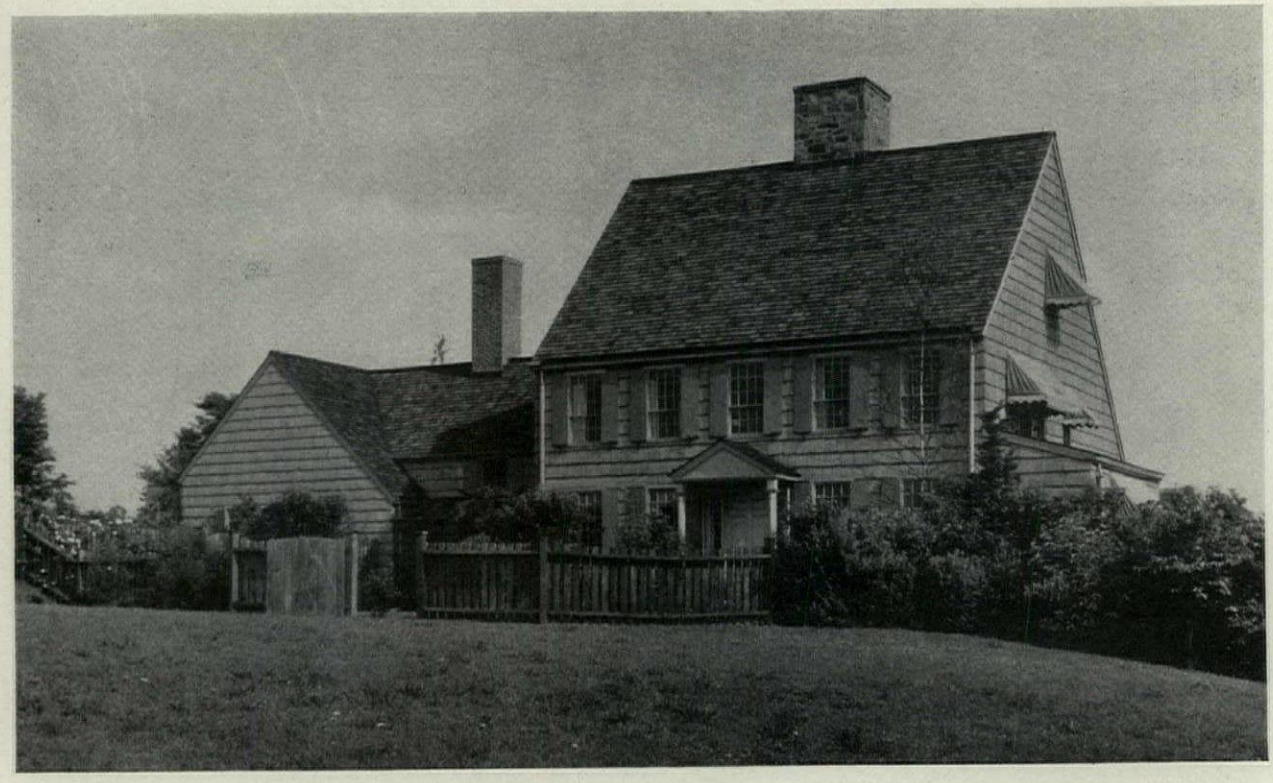
FROM A CRAYON DRAWING BY W. J. HUCHTHAUSEN

Size of original, 9½" x 13"

PONTE PIETRA, VERONA

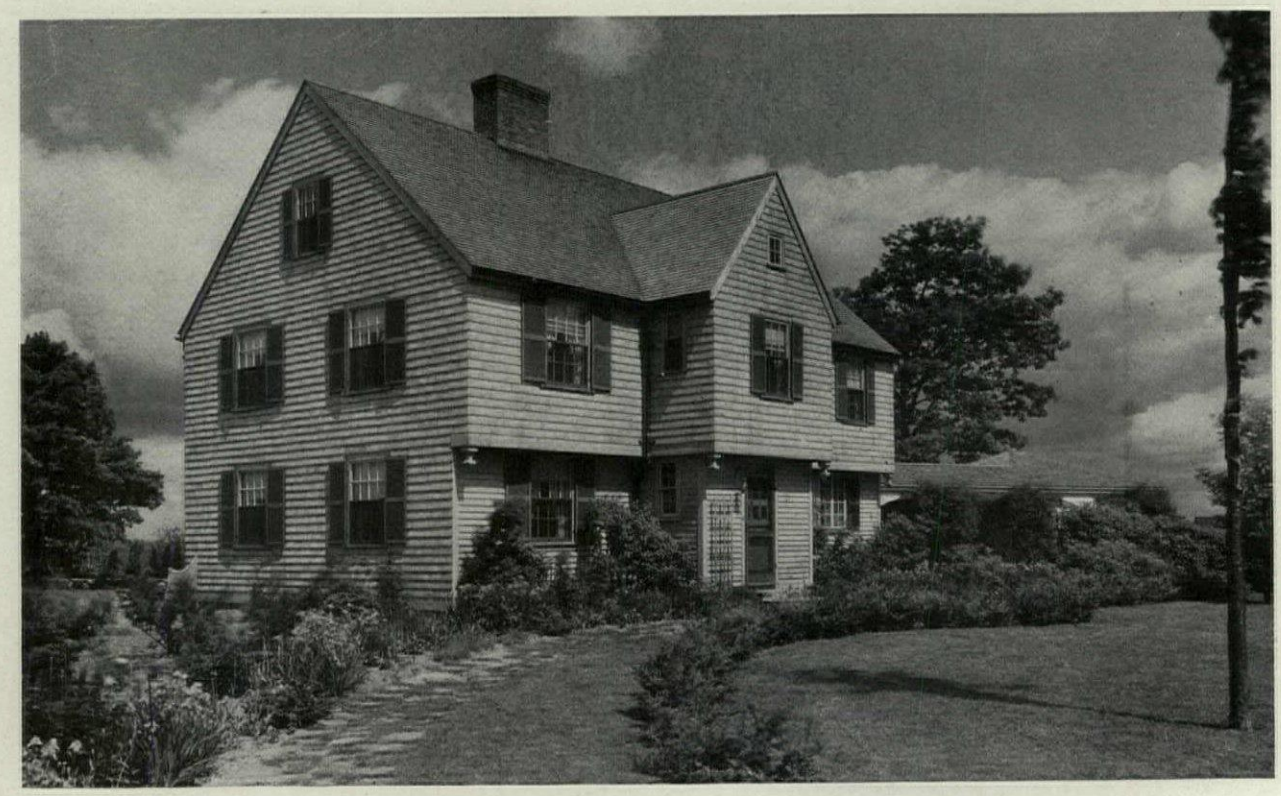
FROM A CRAYON DRAWING BY W. J. HUCHTHAUSEN

Size of original, 10¼" x 14"



THE SPERRY HOUSE, SOUTHBURY, CONNECTICUT
Cameron Clark, Architect

Early American Forms as Precedent for Present-day Small House Architecture



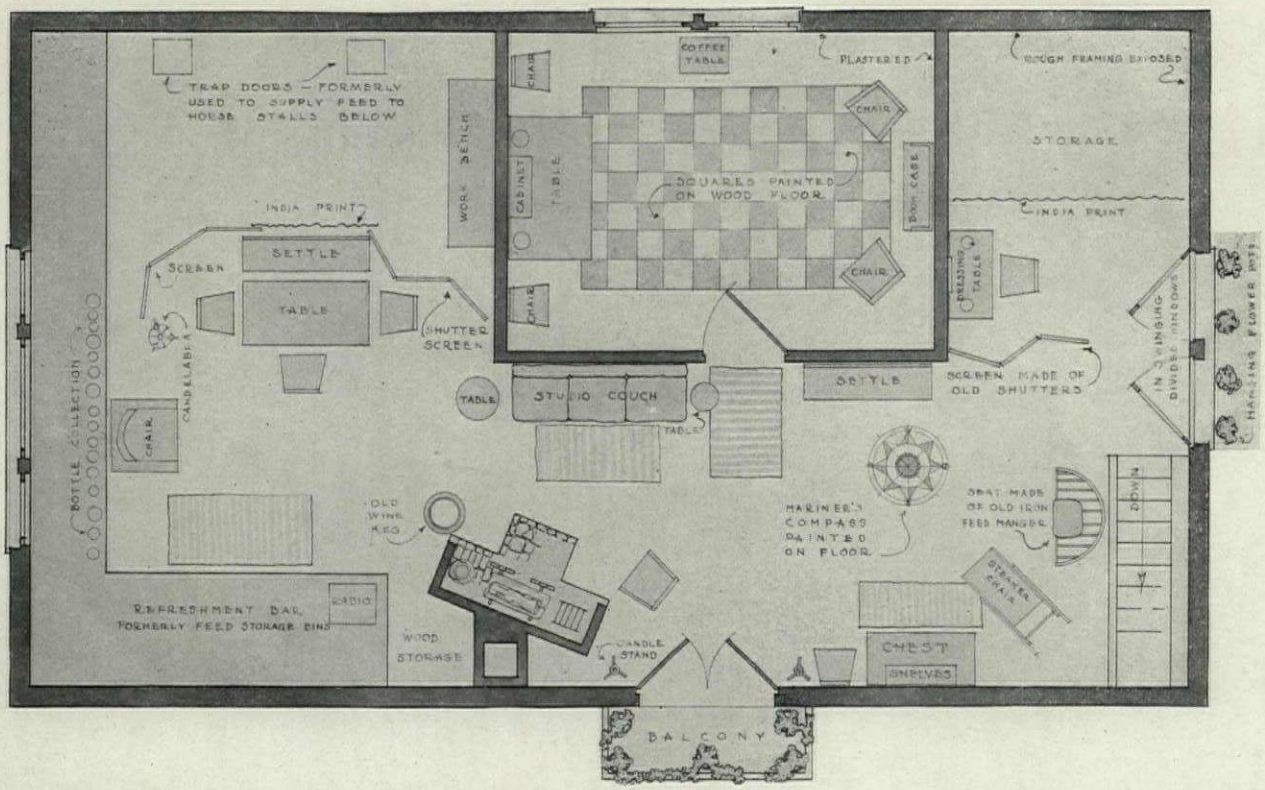
RESIDENCE OF MRS. FRANK VAUGHN, SOUTHBRIDGE, MASSACHUSETTS
Mrs. Mason M. Condict, Landscape Architect

Courtesy A. C. and H. W. Dickins, New York

PLACE ST. GERMAIN DES PRÉS, PARIS

FROM A DRYPOINT BY LOUIS C. ROSENBERG

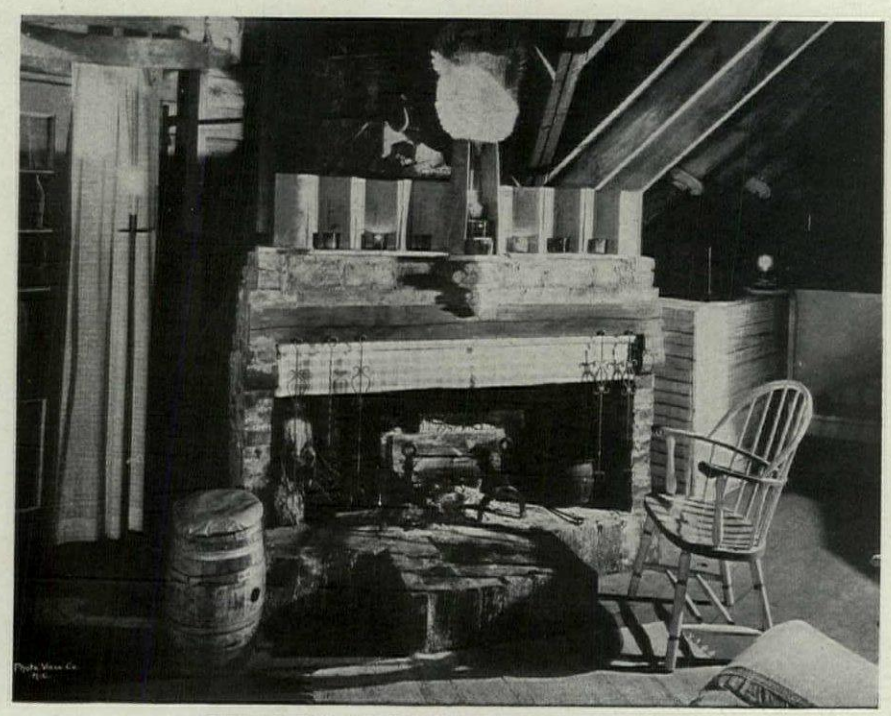
This plate was awarded the Mrs. Henry F. Noyes Prize for the best print in the recent Seventeenth Annual Exhibition of the Society of American Etchers.



A Draftsman's Retreat

By William Vandel

One fine afternoon forty years ago, a contractor who builded well and wisely completed a house and stable on a tract in the outskirts of a small but growing young city. He probably did not bother to speculate on the future of his completed job, during the next decade or so. It would have surprised him to know that the city would grow miles beyond the place, that apartments housing hundreds of families would replace the neighboring mansions, and that a young architectural draftsman would want a workshop and studio to use in his spare time and would cast a speculative eye toward the old stable.



THE STUDIO READY FOR TEA OR ANYTHING

Upon inspection the stable showed possibilities. Since it had been entirely unoccupied and was in a rather dilapidated condition, the owner was glad to let the entire second floor, which had been coachman's quarters and storage for feed, for the small sum of three dollars per month.

The draftsman did all the repair work himself. This included: replacing broken window lights, hanging one pair of double-hung windows so that they would become divided in-swinging casements, building a balcony in front of the double doors on the alley through which the hay for the horses had formerly been hauled up by means of a large swinging iron crane, building the fireplace, painting the floors, and completely redecorating the coachman's room.

This coachman's room, the only finished and plastered portion of the stable, had been built in the center of the second floor against one of the outside walls as shown on the accompanying plan. This unusual plan made the place more interesting because of the resulting odd-shaped outer space. The plaster walls were painted a light cream with a dark grey wainscot, black stars in constellations were pasted on the ceiling, the woodwork was painted brilliant flat blue with mouldings in vermilion, and the floor was laid off in squares, the alternating ones being painted white. Unbleached muslin curtains, with a large appliqué design depicting an artist and his model, were hung over the two windows. The furniture placed in the room consisted of a table (convertible to a drafting table on occasion), a bookcase and material cabinet, a coffee table made from an old cast iron stove, and several chairs.

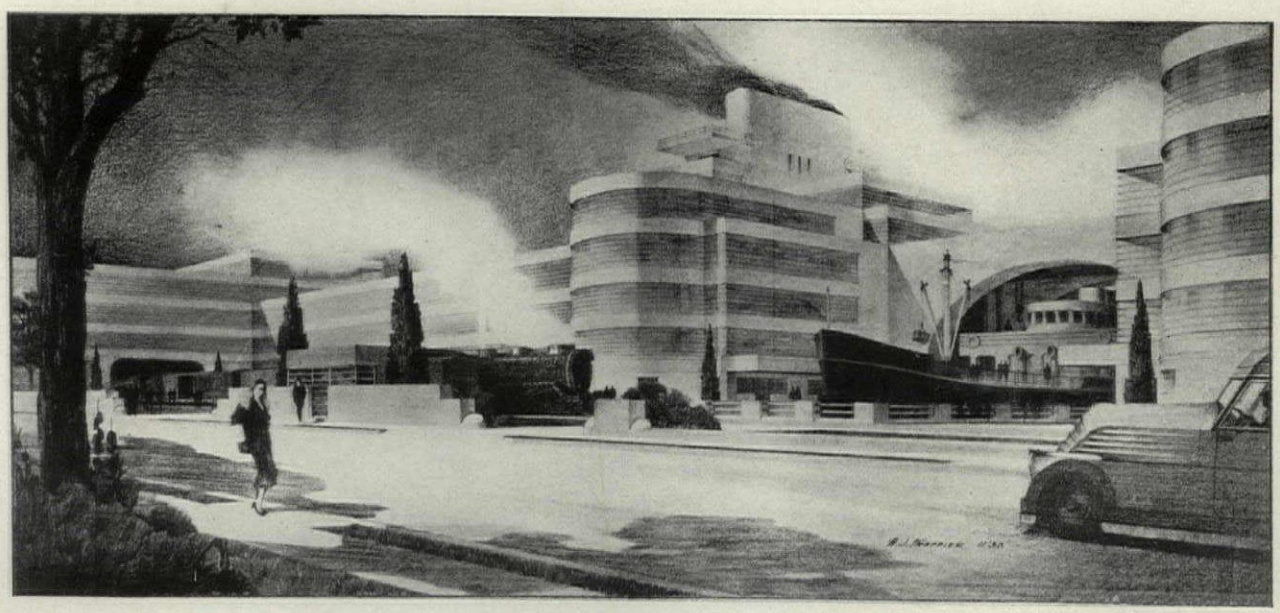
An existing chimney determined the location of the fireplace. A hole was knocked in the chimney to connect the fireplace, which was built one brick thick and raised the height of one brick from the floor. The floor joists were sufficiently strong to support the weight. The unusual angle of the fireplace resulted from the desire to avoid cramped space in front which would have come about if it had been built parallel to the outside wall. Half-round insert tile formed a frieze above the mantelshelf. Into the niches formed were put small whale oil candles burning in colored containers. Wrought iron toasting forks, copies of old Spanish ones, were hung from the wooden supporting beam. An old wine-keg was placed at one side of the fireplace for a seat and an old kettle, used formerly by slaves during civil war, was set inside to be used for cooking when occasion demanded. A valance of red checked gingham was hung below the beam to improve the draft and provide a spot of bright color. Though very near the burning fire it does not burn because of the indraft of cool air.

The furniture in this portion of the studio was procured from various sources—gifts from friends, purchases from second-hand stores, and some from a storage locker of the owner. Most of the furniture was repainted and reupholstered by the draftsman. One very interesting seat was made from an old iron feed manger found in the horse stalls of the stable. Several decorative screens were made from old shutters and were painted a faded bottle green. Several India prints were used to screen off the low ceiling portion of the room where the rafters did not allow sufficient head room.

The tops of some old feed bins formed an ideal refreshment bar and buffet when food was to be served. A high ledge along the south wall, the result of an overhanging gable in the exterior architecture of the stable, made an ideal place for a bottle collection (empty).

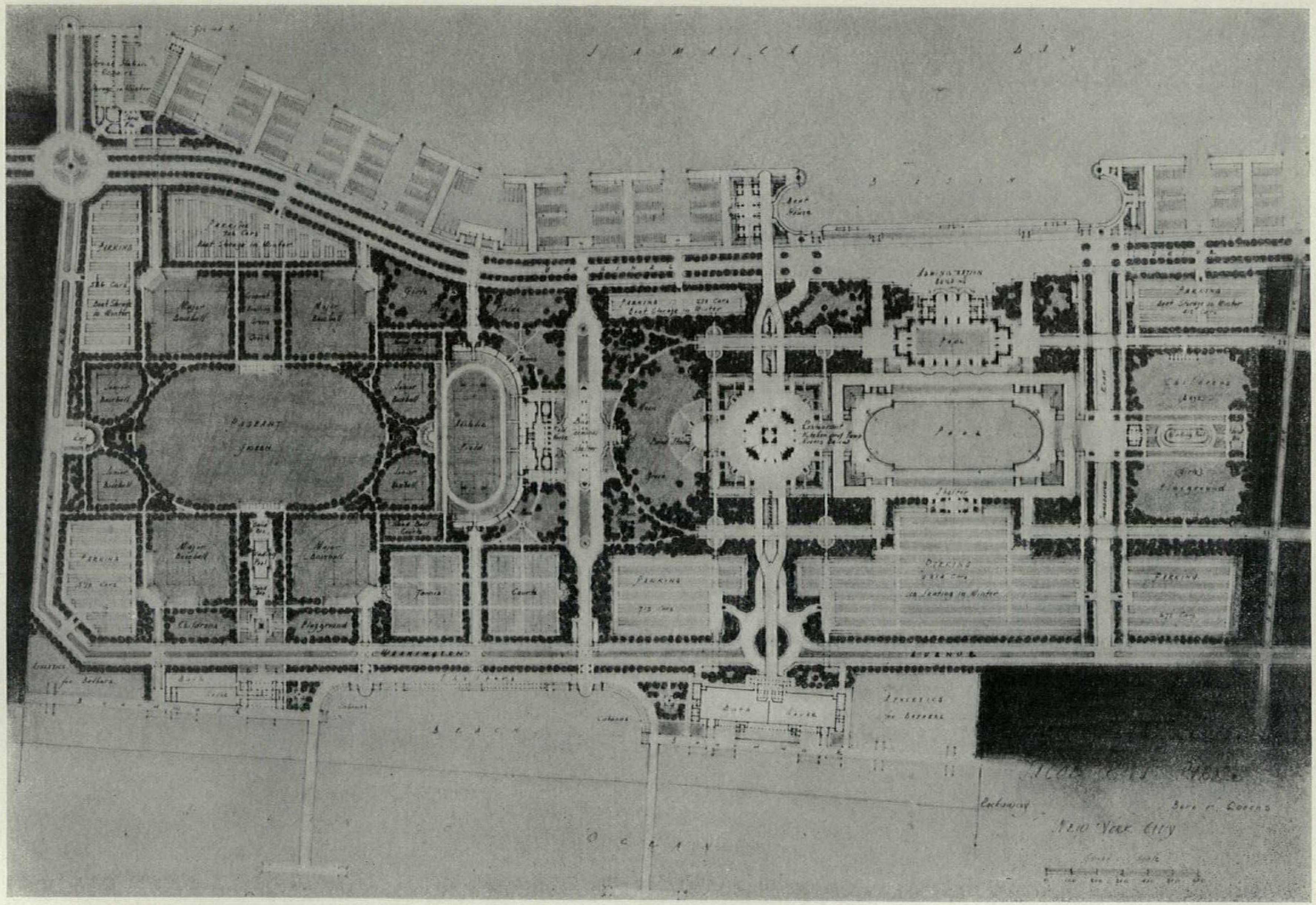
The lighting of the completed studio is mainly by candles. Several wrought iron candelabra and a wrought iron chandelier give general illumination and small wrought iron candlesticks, also holding candles, give needed light on tables and chests. Electric lights are used for drafting or modeling but, because of their unromantic aspect, are kept out of sight except when needed.

There are many such old stables in the older parts of our cities in which one so-minded might create a similar retreat. For anyone interested in making much out of little, in using his ingenuity to create effects, and in using his spare time in a constructive manner, such a similar project might be attempted. If the worst came to the worst, who knows but that such a place would offer an artistic though not modern haven until the financial storm had abated and architectural draftsmen again could afford houses or apartments.



FROM A RENDERING IN CRAYON ON TRACING PAPER BY ARTHUR J. FRAPPIER

A sunlight factory building on the proposed reclaimed salt meadows and swamps along the Hackensack River, New Jersey, with all types of transportation correlated to assure the efficient functioning of industry as proposed by the Regional Plan Association, New York.



A suggestive plan for the development of Jacob Riis Park on the Rockaway Peninsula in the Borough of Queens, New York City, designed and rendered by A. J. Frappier for the Regional Plan Association, as an indication of the possibilities of active recreation consistent with certain features of city and even region-wide importance. See page 97 for further description.

THE SPECIFICATION DESK

Floors and Flooring Materials—2

By David B. Emerson

Editor's Note:—*Part 1 of this article, covering wood floors, cork tile floors, rubber tile floors, and mastic floors, was published in the January issue.*

Asphalt Tile Floors

Asphalt tiles are a comparatively new flooring material but they have given excellent service during the time they have been used. They are composed of binders made up of asphalts, pitches, resins or a combination of these ingredients, together with fillers such as asbestos fiber, asbestine, or other minerals combined with the necessary mineral coloring pigments. The asphalt base renders them non-absorptive; therefore they can be used with perfect safety in basements and damp spaces where some of the other flooring materials can not be used. They are noiseless, highly resilient, non-absorbent, acid and alkali resistant and will not curl or buckle. They have good wearing quality and are fire resisting due to the asbestos used in their composition.

The standard sizes made by practically all manufacturers are 6 inches x 6 inches, 9 inches x 9 inches, 9 inches x 27 inches, 12 inches x 12 inches, 12 inches x 24 inches, and 18 inches x 24 inches. The standard thicknesses are ⅛ inch, 3/16 inch and some manufacturers make a special tile ⅜ inch thick. They are made in about twelve plain colors and about thirty different mottled colors.

Asphalt tile can be laid either on a cement base or a wood base, and practically the same conditions which are required for a base for cork tile or rubber tile apply to asphalt tile, except that an underflooring should always be laid on top of the wood base. This underflooring is composed of some form of plastic fireproof material reinforced with galvanized wire mesh and having a minimum thickness of ⅜ inch. Asphalt tiles are laid in a special asphalt cement, which in practically all cases is some type of emulsified asphalt and may be finished practically the same as mastic floors and the same precautions in the selection of finishing materials must be followed.

Linoleum

Linoleum is one of the most extensively used floor materials, nearly twenty-five per cent of all the flooring material on all construction work, other than in residences, being of linoleum. It is generally claimed to have been invented in England by Frederick Walton, who obtained a patent for the process in 1860. It is composed of linseed oil, which is oxidized until it hardens to a tough rubber-like substance, then mixed with powdered cork, wood flour, various varnish gums and suitable color pigments, and pressed on burlap by means of heavy steel rolls. It comes in many solid colors and in innumerable patterns. In fact there is no limit to the possibilities of color combinations with this material. The patterns extend clear through the linoleum composition, consequently they can not wear off.

Linoleum is made in five standard thicknesses, designated as "Heavy Battleship," 6 millimeters, approximately ¼ inch thick, "Medium Battleship," approximately 3/16 inch thick, "Light Battleship," "A gauge," approximately 5/32 inch thick, "B gauge," approximately ⅛ inch thick, and "C gauge," approximately 3/32 inch thick. It comes in rolls generally two yards wide. Some linoleums are finished with lacquer at the factory and some are waxed.

Linoleum, like all of the other so-called soft floorings previously described, can be laid on either a cement or wood base but, like rubber tile, should never be laid on cement floors which are in direct contact with the ground. Practically the same conditions with regards to the base which are required for all other soft flooring materials apply to linoleum. On a cement base it should be laid so that the edges of the sheets will have a lap of ½ inch to ¾ inch, and it should be secured to the cement floor to within four inches of the seams, using a special linoleum paste. It should be thoroughly rolled into the paste with an iron roller. After the body of the linoleum has been thoroughly cemented to the floor, with the seams properly lapped, the seams should then be cut through both thicknesses and the area beneath the edges of the linoleum embedded in linoleum paste (some manufacturers recommend a special waterproof cement) and thoroughly rolled down to give a tight, even job. Patterned linoleum should be laid with butt joints, so that the pattern will be continuous. All seams and joinings in the linoleum should be thoroughly weighted down to secure perfect adhesion.

On a wood base the floor should be covered with lining felt weighing 1½ pounds per square yard, laid with the material at right angles to the floor boards, with butted joints and with cross joints staggered.

The felt should be bedded in linoleum paste and well rolled into the adhesive. The linoleum should then be laid in the same manner as on a cement base.

The finishing of the linoleum after laying is a very important item and means much to the appearance of the floor. Varnish should never be used on linoleum because of the flexibility and resilience of the material, and it cannot be used at all on linoleum that has been given a protective coat of wax at the factory. Shellac is even more unsatisfactory than varnish, due to its brittleness, and should never be used on linoleum, under any circumstance whatsoever. One of the best, if not the best, treatments for linoleum is a coat of lacquer and one or two coats of wax, if not waxed at the factory, which is always to be preferred.

All of the preceding floor materials which have been described can be used very satisfactorily for stair treads, and all of them have special sections for bases, plinths and

wainscots. Also, there are numerous special metal attachments on the market which provide stair nosings, edge and border strips, and all other necessary attachments to finish the floors properly.

Burnt Clay Tile Floors

Of the various hard floors, tile is without doubt the most widely used of any. The different kinds of tile in general use and the methods of manufacture were very thoroughly described in my article "Burnt Clay," Part II (Pencil Points, January, 1930).

Tile as a flooring material has many excellent qualities; the vitreous tiles are absolutely impervious and nonstaining; they are unaffected by moisture, and due to the process of manufacture are positively nonfading. For use in bathrooms, toilet rooms and similar spaces, ceramic tiles are probably the most suitable. For kitchens in hotels, clubs, hospitals, and institutions of a similar character, quarry tiles are probably the most suitable. For rooms where a decorative effect is desired there is a very extensive range of tile in the quarry tiles, flint tiles, and the numerous types of unglazed floor tiles in all shapes, sizes, and colors.

One thing I would advise is never to use glazed tiles for floors where there is to be any amount of traffic, as the glaze is very liable to fracture and chip off.

All floor tile should be laid in a setting bed of mortar, composed of one part Portland cement and three parts sand, and may be tempered with about five per cent hydrated lime. The foundation for tile floors may be either a cinder concrete fill on the floor slab or the floor slab itself (this is not recommended, but conditions may make it necessary), in fireproof buildings, and cinder concrete fill on wood platforms in wood framed buildings. For ceramic and flint tiles the foundation should finish 1½ inches below the finished floor level, and for quarry tiles, the foundation should finish about 2 inches below the finished floor level. Ceramic mosaic tiles, as the small ceramic tiles are called, are mounted face downward on heavy sheets of paper at the factory, in strips usually about two feet long by one foot wide. After the tiles have been set in the mortar setting bed, the paper is moistened and peeled off. Ceramic and flint tiles should be laid with close joints, grouted with Portland cement mortar, and quarry tile should be laid with joints ¼ or ½ inch wide and slightly concaved. Joint strips ½ inch wide are made by some of the tile manufacturers so that quarry tiles may be laid with tight joints. This method of laying quarry tiles is favored by some architects for use in hotel and restaurant kitchens, as they claim that the wide cement joints absorb grease.

With the great variety of colors and shapes which are available at the present time it is possible to produce a range of patterns in tile floors from the simple arrangement of squares and rectangles in solid colors to intricate weaves in color combinations which equal, if not surpass, the parquetry of the French palaces.

Terrazzo Floors

Terrazzo is at the present time, next to tile, the most extensively used of the hard floors. Terrazzo Veneziano, as it was originally called, takes its name from the province of Venetia in Italy, where it had its origin and where it was extensively used for flooring. Just when it was first used is almost impossible to determine, but it probably dates back to the Middle Ages. The early terrazzo was composed of lime mortar, mixed very dry and inlaid with small pieces of marble, not too large to pass through a one and a half inch ring; the whole mass beaten hard, rubbed down, and polished.

Our present-day terrazzo is somewhat different, but much of the old fundamental principle still exists. The chips or granules are graded into three sizes, "No. 1," which is about ⅛ inch to about ¼ inch in size, "No. 2," which is about ¼ inch to about ⅜ inch in size, and "No. 3," which is about ⅜ inch to ⅞ inch in size. There are about twenty-three different domestic marble and limestone granules on the market, and about fourteen foreign marbles are being imported at the present time, and an infinite number of different combinations are possible, using different quantities of the different granules and different colored cement. Some of the leading terrazzo contractors in New York City figure the same price for terrazzo, no matter what combinations are called for, so that is one item which the specification writer does not have to worry over. Terrazzo can be laid over either concrete floor slabs (the most general method), or over wood floors.

There are two methods of laying terrazzo, both of which can be used over concrete floor slabs. With the first method a cinder concrete fill not less than 1½ inches thick is laid on the floor slab, finishing two inches below the finished floor level. Over this cinder fill an under bed 1¼ inches thick, composed of one part Portland cement and four parts sand, is laid. The terrazzo topping is laid on this under bed and should be between ½ inch and ¾ inch thick, composed of two hundred pounds of granules to one hundred pounds of either gray or white Portland cement. Where colored cement is desired the colors should be the best nonfading alkali resistant mineral pigments.

The second method, used where there is any possibility of cracking due either to settlement, expansion and contraction or excessive vibration, is slightly different from the first method. With this method a total thickness of at least 3 inches is required, and the work is started directly on the concrete floor slab. The slab is first covered with a thin bed of dry sand (about ¼ inch thick), over which a single thickness of tarred paper is laid, thoroughly lapping all joints. The setting bed, which should be at least 2 inches thick, is laid over the tarred paper, and the terrazzo topping is laid over this setting bed, exactly the same as with the first method. The setting bed in the second method where its thickness exceeds 2½ inches may contain a coarser aggregate, such as fine gravel or cinders.

Where terrazzo is laid over a wood floor, the floor should first be covered with tarred paper, over which a galvanized wire netting made up of No. 14 gauge wire 2 inch mesh should be securely nailed. Over this the concrete under bed and terrazzo topping as described in the second method should be laid.

One of the most important items in the laying of terrazzo floors, and the one which prevents cracking (the great fault with terrazzo floors in the past), is the proper use of metal dividing strips in the terrazzo topping. These strips are made of brass, white metal, aluminum and various alloys. They are usually 1¼ inches wide and of different thicknesses, No. 20 gauge, No. 18 gauge, No. 16 gauge, No. 14 gauge and ⅛ inch being most generally used. Any type of strip which may be used should have some feature which will produce a positive mechanical bond between the terrazzo topping and the strip, and all of the better type of strips have it. If aluminum strips are used they should always be painted with a paint having an asphalt base, due to the corrosive action of the alkali in the cement on the aluminum.

The strips should always be so placed as to divide the floor into two foot squares, or into geometric patterns,

each division of which shall have an area of not over five square feet. Wherever possible the strips should come directly over the floor beams, as that is the vulnerable spot in all flooring so far as cracking is concerned. Too much stress cannot be laid on dividing the floor surface into small units. I know of one very fine office building in New York City, built about ten years ago, where the floors in the corridors are divided into four foot squares, and there are numberless cracks, whereas, I know of a great number of floors laid about the same time with two foot squares, or smaller, where there are no cracks. The strips should always be installed while the under bed is in a semiplastic state, and should be set down into the mortar about ½ inch.

The terrazzo topping should be placed in the spaces formed by the dividing strips, and right here let me give a word of advice to the prospective user of terrazzo. If there is any need for economy in installing terrazzo, always remember to use only one color combination in the floor, as in that case the entire floor can be laid in one operation whereas if two or more combinations are used, all the spaces in one combination must be laid and some time allowed for the mass to set, and then all the spaces in the other combination will have to be laid, which naturally increases the labor cost. Although this extra cost is not much per square foot, it counts up in a twenty-story building. When finished a good terrazzo floor should show the maximum amount of marble granule obtainable.

When the terrazzo has set sufficiently hard it should be machine rubbed with abrasive stones and brought to a smooth finish.

Where a nonslipping surface is desired in terrazzo floors, an abrasive aggregate, composed of aluminum oxide, which is an electric furnace product, can be mixed with the terrazzo topping using two parts abrasive to three parts granule where the floor is liable to be used for heavy traffic. Where the floors are only to be used for light traffic, the abrasive may be sprinkled on the surface only in such quantity as will show in the proportions of five parts granule to one part abrasive.

Where a decorative effect is desired or any particular scheme of design has to be followed out, terrazzo floors are frequently laid with marble borders.

Terrazzo does not require any particular finish, but a new type of material is on the market which, when applied to the surface of the freshly finished terrazzo, acts as a sealer, thereby preventing the too rapid evaporation of the moisture contained in the mixture. This treatment slows down the period of setting, makes the terrazzo harder, and aids materially in preventing cracks.

Terrazzo base, wainscot, partitions, and stair treads are quite extensively used and have given very good results. These can be either precast or run on the job. When terrazzo wainscot is run on the job the topping is installed in two layers, each ⅜ inch thick.

Mosaic Floors

Mosaic floors have been in use so long, that no one knows just when or where they originated. We do know that they were used extensively by the Greeks and by the Romans, and that the Romans extended their use as far as Britain, where many examples have been found in London, in Bath, in the Isle of Wight, and as far west as Caerwent in Monmouthshire. The Roman mosaic was a work of art both from the standpoint of design and craftsmanship. They made use of practically every colored marble then available, and the number of quarries which were operated at that time was large, and extended over a far-reaching empire.

The modern mosaic is made up of marble cuboids usually about ¾ inch square, called "tesseræ." For ornamental designs, pieces of triangular or other shapes are used. In laying mosaic floors it is customary to arrange the tesseræ face downward on sheets of fairly heavy paper, large enough to contain reasonably large sized units of the floor. Where special designs are used in the work, the design is drawn on the paper, and the pieces are set on the drawing. The pieces of marble are stuck to the paper with an adhesive material which will lose its strength when wet. These mosaic units are laid in place in a setting bed of cement mortar composed of one part Portland cement, two parts sand, and a sufficient quantity of hydrated lime or lime putty to render the mortar plastic. This setting bed should be laid on an under bed of cement mortar, one inch thick, mixed in the proportions of one part Portland cement and three parts sand, laid on a cinder concrete fill and levelled off one inch below the finished floor level. The paper backing is stripped as soon as it can be done without pulling the tesseræ out of the setting mortar. Usually the work necessary to connect the adjacent units of the mosaic is done by setting the intervening material by hand, piece by piece. More or less of this work is usually necessary to complete the job.

The floor should be well grouted with cement mortar and machine rubbed with abrasive stones.

Brass dividing strips are used to prevent mosaic floors from cracking the same as with terrazzo.

The most noticeable difference between the Roman mosaic and the modern mosaic is the size of the tesseræ, those used by the Romans generally being only ¼ inch square. In the Pompeian Garden in the Metropolitan Museum of Art the floor was laid with tesseræ of that size, and it certainly looks much better than the usual modern work.

Very pleasing effects have been obtained by using combinations of terrazzo and mosaic in floors. Where this is done the two materials should always be separated by brass dividing strips.

Mosaic floors, like terrazzo floors, are frequently laid with marble borders to obtain the desired decorative effect.

Marble Floors

Marble floors are generally used where the most decorative effect is desired, and where the question of expense does not have to be considered. Marble has been the accepted flooring material in a high class building, both public and private, for centuries. It was used both by the Greeks and by the Romans, and the floors in the Villa of Hadrian near Tivoli still exist. It was used quite extensively in Italy and France during the time of the Renaissance. In England from the time of Wren up to and through the time of the Brothers Adam, floors laid in diagonal squares of black and white marble were almost universal in the stair halls and some of the more important rooms in the finer class of houses, and their use has continued down to the present time.

In this country the use of marble as a flooring material did not begin, so far as I can learn, until about the end of the eighteenth or the beginning of the nineteenth century, and then only in public and semipublic buildings. This was undoubtedly due to the fact that the domestic quarries had not been properly worked, and the importation of large quantities of foreign marbles was hardly feasible with the small amount of shipping the colonists had at their command.

Marble floors are divided into two types; namely the tile floor and the slab floor, the difference being merely in the size of the units used in the floor. Marble tiles are small,

thin slabs of marble cut to a suitable size and shape. They vary from 6 inches x 6 inches to 12 inches x 24 inches, and do not exceed two square feet in area. All sizes larger than this are classed as "floor slabs." Small tiles less than 6 inches x 6 inches, used in pattern floors, are known as "dots." The long narrow strips which are used as boundaries and subdivisions in floors, the main body or "field" of which is of marble tiles, terrazzo, or mosaic, is known as "border." Tile within the limits of size given, border, even in rather long strips, and dots, can be produced in a considerable quantity from odd pieces cut from material which will not yield merchantable stock, except in the comparatively small sizes used for tile, border, and dots. As these items are naturally more or less of a by-product of the marble industry, the price at which they are sold is very naturally influenced thereby. Border more than 12 inches wide or more than 6 feet long, and tiles larger than the sizes given cannot be obtained under ordinary conditions, except from large slabs of merchantable stock, therefore they cease to be a by-product, and the price very naturally increases accordingly. Tiles and border are made from stock that is from ⅞ inch to 1¼ inches thick as it comes from the saws; the finished material will vary in thickness from about ¾ inch to 1⅛ inches, but about ninety per cent will ordinarily run about 13/16 inch thick. If they are specified to be of any thickness beyond these limits or of any perfectly uniform thickness, they will cease to be a by-product, and again the price increases.

Large slabs should be specified to be at least 1¼ inches thick, so that they will not break in handling. Slabs which are more than 18 inches wide, and more than 4 feet long, or which contain more than six square feet, should be specified to be of greater thickness.

All tile and border should have the edges "full" at least ½ inch from the top. If the edges are undercut too near the top surface, the thin edges will crumble and wear away. Tiles cut to size with an abrasive wheel generally have full edges for the entire thickness, whereas those that are squared up on a rubbing bed generally have undercut edges. Although too much undercutting is not good, a little undercutting is really very good, as it makes it much easier to bed the tile accurately, because it leaves a little space to take up the surplus mortar when the tile is tamped in place.

Marble floors should be set in a bed of cement mortar, composed of one part Portland cement, and two parts sand, mixed so as to be quite stiff. The thickness of the mortar should at no point be less than 1 inch, nor more than 1½ inches. Before setting the under side of all floor marble should be well buttered with liquid cement.

The joints in marble floors should not exceed 1/16 inch, unless a wider joint is specified to obtain a desired artistic effect.

After the mortar setting bed has set hard enough to bear the weight of the workmen, all joints should be thoroughly grouted with neat cement, brushed in until all joints including the spaces under the edges of undercut tiles are solidly filled with the grout. With white and very light-colored marbles it is a very good practice, and recommended by some of the best authorities, to grout with nonstaining white Portland cement.

Marble floors should be given a fine sand machine finish or be finished with what is known in the trade as "No. 80 grit abrasive rubs."

In selecting marble for flooring purposes, where more than one kind of marble is to be used, care should always be exercised to select marbles which are as nearly as possible equal in their resistance to abrasion, so that they will wear equally. As a general rule it is better to select "unicolored" marbles for flooring; they are generally more sound than most other kinds of marbles. The highly colored "variegated" marbles should be avoided, as they are generally unsound, and the beauty of their colors is seldom brought out except by polishing, and with a sand rubbed finish they sometimes only look dull and dirty. Some of the Group "C" and even Group "D" marbles are quite hard and resist abrasion very well, and although they are unsound in large slabs, will often produce good marble tiles.

Soapstone Floors

Soapstone is quite frequently used as a flooring material and makes an excellent floor. It looks very well and on account of its neutral color it harmonizes with any surrounding material or any decorative scheme. Due to its extreme hardness it wears very well and also it is non-slipping. It is subject to practically the same conditions as marble as to cutting and setting, except that soapstone slabs are usually 1¼ inches thick. The hard soapstone should always be used for flooring. Soapstone floors are generally given what is known as a "toothed abrasive" finish by rubbing with steel shavings. They can be given a sand rubbed finish, but it is not recommended. Soapstone floors should be set in practically the same manner as described for marble floors.

Slate Floors

Slate has come into prominence in this country as a flooring material, of late years, although it was used abroad for centuries. It is an excellent wearing material, and its interesting range of color produces a very pleasing floor. It is a dense, compact natural rock and is one of the least absorptive of all natural stones. As a flooring material it has a number of decided advantages, some of which are a wide range of unfading colors, a desirable texture, freedom from cracking or splitting, and the natural characteristic of the material which makes it non-slippery. It has been used in many different types of buildings, but it seems to fit particularly well into church buildings. The Chapel of the Intercession in New York City, designed by Bertram Grosvenor Goodhue, has a very fine slate floor which harmonizes remarkably well with its architecture. Slate floors are laid in numerous patterns, among which are the "random," or "irregular," with rough edges, "semirectangular," and "random rectangular," with sawn edges, or in elaborate geometrical patterns as was done in the Detroit Institute of Arts. It may have a rough split surface, or where a more formal treatment is desired it can be given a smooth rubbed finish.

Slate floors should be set in cement mortar, the setting bed being from 1 to 2 inches thick, and all joints should be well pointed up with cement mortar, composed of one part Portland cement and two parts sand.

Flagstone Floors

In addition to the various stone floors described various kinds of flagstones are used for flooring. These stones are practically all of a fissile character, and are cut, jointed and laid practically the same as slate, and all of them produce very interesting floors which give excellent service.

Magnesite Floors

Magnesite floors are a special compound in which the principal ingredient is magnesite, a magnesium carbonate. They are made in plain color and in a special terrazzo. They give very good service, are resilient and fire resisting. These floors so far as I know are always laid by the

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