[Written especially for this Journal.]

REDWOOD TIMBER.

Its "Staying" Properties.

As we look at the decomposing particles of material in the building, there is behind all these effects a cause by and through which the timber responds to the decomposing influences of the atmosphere with which it is brought in contact, while other and contingent portions, often of the same timber, but generally different sticks cut from the same tree, seem to be impervious to these influences.

Years ago, architects (the reason for which they had no explanation) would strive to reconcile the seeming paradox by placing the timbers in certain relative positions in the building as compared to the tree before being cut. We often wondered at the reason for this, and though these men constantly exposed themselves to ridicule and sarcasm, nevertheless, if let alone, they invariably succeeded in overcoming the gravest of objections relative to the use of certain woods notorious in that country as quick to decay, *in spots*. If we examine carefully, by means of the microscope, a vertical section of redwood, for instance, we shall find on the micron the form represented in Fig. 1.

Fig. 1.

The parallel lines running lengthwise represent the grains as seen with the naked eye, the small spots the resinous matter peculiar to the family of plants of which this timber is a member, while the irregular lines running in every direction, and when a general longitudinal direction never crossing the grains of a perfect tree, thoroughly ramifying and permeating every particle of the cellular matter, seems to be the transit ducts for conveying this resinous fluid all through the interstices of California redwood. This, so far as could be demonstrated by means of a dry sample of wood, seems to obey the general law of crystallization, and gradually settles into these cavities, as the sap winds its way upward. As another proof that this condition of things is common, as we approach what may be termed the upward portion of the tree, these crystals gradually become smaller, and when the topmost branches are reached they cease to assume this form, seemingly present only in solution or sap, notwithstanding the fact the twigs and leaves contain them but in a different form, showing that the solution, as it may be called with the utmost propriety, slowly deposits this sediment in the interstices on its way *upward*, and, when the utmost limit has been reached, becoming a vapor, leaving, *not depositing*, the remaining portions of this resinous matter, hence the diverging form of crystal as it appears magnified.

A very interesting and important phenomenon is manifest in the protuberances and excrescences often seen in these celebrated trees of California, but owing to the lack of sufficient samples we will not discuss these at this time, holding for the subject-matter of another letter. It will be seen as the right-hand side of the cut is approached, though the grains appear but slightly thicker, the lines and spots become less marked; it follows, then, that as the tree grows older, and the rings larger, they do not absorb this matter in the same proportion. To the contrary, so far as we were able to judge from chemical analysis, the ring seven years from the heart contained as much of this resinous matter as a ring twenty or more years nearer the bark, where the tree was at least three times larger. This elicits a botanical consideration of plant growth, not of vital interest to the majority of our readers. Suffice it to say that the conclusions deducable from what has already been proven, each year the flow of the fluid containing this matter ceases, the entire energy being directed to the formation as well as maintenance of the ring being formed each succeeding year.

It would follow, therefore, that, so far as the life or staying properties of redwood are concerned, the nearer we approach the bark the less value the timber in this respect, for, while on the one hand the cells are greater in number and more closely huddled together, the outer edge contains fewer cells, farther apart, larger, and not so evenly distributed. Again, nearer the pith or heart, as stated before, these cells are filled with one of the best and efficient elements to repel moisture known; while further out they are merely coated, not filled; hence the moisture is invited to enter, and being subjected to the vagaries of a changeable climate, together with the acid-impregnated atmosphere of cities, it is soon absorbed or set free, and the timber rots. To this end

"We'll deem it not folly
Nor esteem them weak"

Who persist in placing the inner side of timbers to the greatest influences that tend to decompose.

By examining Fig. 2, taken from a thin vertical section of the same kind of timber, it

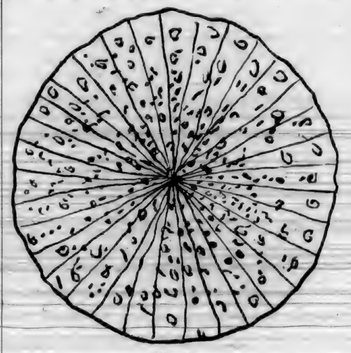


Fig. 2.

will be seen that the cells decrease in number and increase in size as we approach the outer edge. This sample was but a single ring, and, by means of an ordinary compound instrument, it is very easy to determine the inner from the outer side of a stick, merely by the size and number of these resin cells.

Supplementary to what has already been said, the question of strain or tension of this interesting wood should be discussed from the physical features as illustrated with the microscope. Chemistry can do nothing to show this, while physical appliances and mechanism are too apt to consider these considerations as beneath the dignity and unworthy the consideration of that mighty science.

If it was desired to bend or otherwise distort any substance by means of mechanical forces, we would naturally place the molecular portion at the radius; for instance, if a bar of iron was firmly attached to one of lead, bending toward the latter would displace fewer molecules than the former, but the reverse way would furnish the greater resistance. Theoretically, then, California redwood will bend easier toward the bark, but would respond with less force than toward the heart; hence, if strength is the primary motive, the timbers should always be placed in such position that the inside will meet the resistance. If we wish spring, quick reaction, and flexibility, the reverse side should be exposed. Now let those who have practically demonstrated this theory, for such it is, say whether this is a pertinent conclusion or not. In any event, so far as the staying or lasting properties of this timber are concerned, we are positive that these conclusions are conclusive, but it should constantly be borne in mind that, in some instances, we might say many, all these properties we have tried to illustrate are brought into requisition, it being difficult to tell which are of the most importance in this event. By careful mathematical calculations, it will be found that in very many instances when we bring into requisition one of them, the other one next in importance will only be contingent, and in some instances the strength and property required of a piece of timber, presenting the varied characteristics

Side Elevation of $5,000 Country Dwelling.—See "Our Illustrations."

of the material in question, may be so figured that instead of detracting from one by bringing into requisition the other, each may be augmented by allowing the other its due consideration and importance, as regards what is required of it in the architectural mathematics.

"First Class."

There is no term of words used in connection with house construction more hackneyed, profligated, or meaningless, than "first class;" no two words design to express a fact, which are more frequently misapplied, or where they so seldom express real intent, purpose, or quality.

"First class," when properly, honestly, and intelligently applied, comprehend and express more than can be expressed by any other two words in the English language, in the same connections, and are therefore pre-eminent as expressing goodness, merit, excellence, and superiority; but the mechanical, commercial, mercantile, and other prevailing business libertinisms of the day, debauch and abuse the term, and apply it when and wherever its use will best serve purposes of deception; hence it is utilized by the frauds of the world under every guise, and is made the watch-word and cry of those whose success can be accomplished only through and by deceptions. It is safe to assume and fix as a fact, that those who are ever prating their personal or business "first-class" isms, require watching, particularly in building connections.

There is no need of men who produce first-class work commending that which commends itself. "First-class" workmanship and materials carry in themselves conclusive evidence as to character and quality. It is the second to tenth rate demagogues, who understand nothing of the honest, practical meaning of the term, who are the more free in its misuse and misapplication, for purposes and with intent to deceive; and it is unfortunate that owners and purchasers so generally permit themselves to be beguiled by this designing class of individuals, who feed and fatten by the practice of studied deceptions, asserting merit and reputation where none exist.

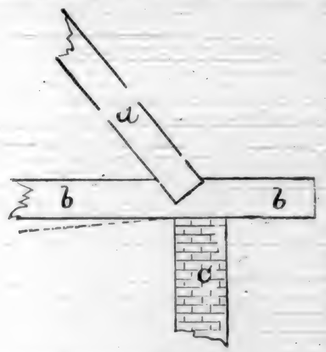
Our Slide-Chimney Thimble Device Patented.

Some fifteen years ago, the Senior Editor of this Journal perfected a slide thimble device for chimneys, which was and is more perfectly fire-proof than any other, and which saves and prevents all cracking of the plastering around the "stove pipe holes." We have used them in our practice ever since, with entire satisfaction, and with benefit to clients. Far less meritorious devices have been patented, and this deserved the protection of Uncle Sam's patent laws, but we did not apply; and as we did not avail ourselves of that advantage, we notice in a last year's number of the *American Inventor*, that one E. S. Sweetser, of Wakefield, Massachusetts, has done so in our stead. The principle of the two devices are exactly the same, and the shape and form alike, varying only as between the round and square ends of the slides and slide plates. And every word that is said in the journal mentioned recommendatory of the device, has been expressed by us scores of times in reference to our own, and is true. If the patented thimble is an original invention with Mr. Sweetser, there is in it a most remarkable coincident of thought and conception between the Massachusetts man and the Editor of this Journal.

[Written especially for this Journal.]

Strength of Timber.

It is a fact well known to all architects that the more kinds of material we put into a structure the more we multiply differences of expansion and contraction, and in some cases that have had our attention called to, the structure has been found sadly out of line, and its general appearance deteriorated by the difference in contractility of materials and even kinds of one material of which composed. Suppose, for instance, we construct a building eleven stories high, the walls of brick, wooden girders and partitions; we place joists across, these are green; we have eleven floors laid upon this green timber. The studding for each story is placed on a firm foundation in the basement, directly over the top of which the partition timbers of the adjacent story are put, followed by another and another until the roof or rafters are reached, when the timbers or studding for the last story are the principal, and often the only support. If we allow the usual per cent. for shrinkage by seasoning, is it unreasonable to suppose that, with this, eleven feet in width of joists will so shrink that the roof will, by its own gravity, fall nearly one foot? Then is it not equally pertinent to conclude that the base of the rafters resting on opposite walls alone will tend to crowd out until the apex finds solidity on the studs of the center and thereby rendered unsightly and possibly unsafe? In explanation of this theory let us suppose the following cut: c to represent the brick wall; b,



the cross-beam, and a, the rafter. The timber b, is supposed to run entirely across the structure, and a, meeting its companion at the apex, stands as it were while together; separated, each will fall. To guard against settling and the like, supports, by means of cross sections or collar beams, are brought into requisition, while these in turn are supported by the studding in the interior of the building. Now at the angle this rafter is placed in, if b should shrink the merest fraction of an inch, the joint ceases to be perfect, and the shoulder bears none of the weight of the superstructure, the same being all transferred to the base of the rafter; and while the cross-section is made of timber supposed to be of the same degree of dryness, the entire weight is thrown on the wall a certain distance from the center.

We will now go to the story below, where we find this timber, b, resting on the partition studding; this, being seasoned the same, it shrinks; b, having the pressure from above, follows the shrinking, and rapidly assumes the shape and position indicated by the dotted line. It will be seen by this that the wall receives the pressure in an oblique manner, and is subjected to a force that will eventually crowd it out of line, as a result in a few years at farthest. We have a building the walls of which are none of them square, not a door or window will open and shut, the plastering and all other interior decorations will rapidly deteriorate in beauty, while in accordance with the force of gravity, all will soon be a mass of semi-ruins. As we have proven, we hope to the satisfaction of our readers, timber invariably shrinks toward the center; hence if mill-owners and operators in filling orders for large stuff would see that their timbers were gotten out so as to lie on edge when in position, and architects see that they were placed in position as ordered, the shrinkage would only tend to make the joints stronger and the floors more solid. These are little things of themselves, but in the aggregate assume great importance, and more especially to those who pay the little bills or suffer the inconvenience of occupying buildings all askew.

The Arch.

The earliest trace in antiquarian researches has assisted us in detecting the first bridge, and to show that it was a tree which had fallen from one bank to the other of some mountain torrent. The method of communication thus supplied by accident, men would soon learn to obtain for themselves by the rude resources of art, and ere long the opposite banks of rivers would become connected by means of timbers or flag-stones supported upon piers.

The application of this notion of a bridge seems to have constituted the whole art of bridge making up to a comparatively recent period. It is, however, altogether inadequate to the passage of deep or rapid currents, and fatal to navigation. We accordingly find the Egyptians, although they swarmed along the banks of the Nile, never built for themselves a permanent bridge across that river.

The Tigris and the Euphrates, on whose banks dwelt that enterprising nation of remote antiquity, the Chaldeans, was bridgeless. And even in the age of Pericles there was no stone bridge over the river Cephissus at Athens.

Necessity is said to be the mother of invention, but there are certain matters which she has been exceedingly slow in coming to. The birth of the discoverer of the arch is a memorable example. Of Europeans, the first who appear to have made the discovery were the Etruscans; the earliest existing specimens of the arch in Europe are to be found among the ruins of the Etruscan tower of Volaterra.

To the Chinese the secret of the arch appears to have been known from time immemorial. In fact it is difficult to fix upon any useful contrivance which is not at present in some degree known to that singular people. They certainly used the arch long before the idea was conceived in Europe. It covers the gateway in their great wall; they availed themselves of it in the construction of monuments to their illustrious dead, and in the formation of their bridges; and we are told that there were stone bridges in China three or four miles long, and arches 600 feet in span.

From the Etruscans the secret of the arch passed to the Romans, and it was soon employed in the construction of bridges over the Tiber. Of these, several remain; they are, however, but awkward specimens of the art of bridge building. Their narrow arches were supported upon high, unsightly piers, which formed a serious obstruction to the current. The Romans have, nevertheless, left us, in other parts of their dominions, bridges of extraordinary strength and beauty. Of these, that of Alcantara is perhaps the most remarkable; its roadway is about 150 feet above the level of the stream which it crosses, and its arches are 100 feet in span. It was built by Trajan, in whose reign was also erected a bridge over the Danube, of which many incredible things are told by Dion Cassius, of which no hing is to be seen but now and then the foundation of a pier. He built it that he might conquer the Dacians; his successor destroyed it, that he might restrain their incursions into the empire.

In those troublesome times which succeeded the fall of the Roman Empire no bridges were built. Rivers were for the most part passed by fords or ferries; these frequently became subjects of contention between neighboring barons, or were taken possession of by outlaws, and travelers in availing themselves of an insecure method of transfer were subject to the certainty of being heavily taxed, and the chance of being plundered.

It was about the commencement of the twelfth century that one Benezet, a cowherd, appeared in the Cathedral of Avignon and announced to the multitude a special mission from Heaven for the erection of a bridge over the Rhone at that city. By efforts little less than miraculous this singular enthusiast contrived in the course of a few years to erect a bridge, which, whether considered in reference to its enormous dimensions, or to the local difficulties to be overcome in its construction, claims to be ranked amongst the most remarkable monuments that have been erected by the skill and ingenuity of man. Unfortunately a flood of the Rhone carried it away. The labors of Benezet did not, however, altogether disappear with this bridge; he obtained a place among the saints of the Roman Calendar, and became the founder of a religious order called the Brethren of the Bridge, by whom some of the finest bridges in Europe were erected. Of these that of St. Esprit, on the Rhine, is nearly a mile in length; and that called La Vieille Bronde, over the Allier, is a single semicircular arch of 180 feet in span, and until the erection of the Chester bridge, which is 200 feet in span, was the largest arch in Europe. Of the same date was the old London bridge, the work of Peter of Colechurch, which would, however, greatly suffer by comparison with the labors of the Brethren of the Bridge.

From this period up to the present, the art of bridge building has continually progressed, and most of the European rivers are now spanned by arches with which the labors of former ages will bear no comparison, either as respects the boldness and grandeur of design or the perfection of their detail.

Rear Elevation of $5,000 Country Dwelling.—See "Our Illustrations."

Damp Houses.

The common bricks produced by most of the dry-clay machines absorb much more water than do those made by machines which thoroughly temper the clay. There is too much ignorance displayed in regard to the material produced by this line of inventions, and which enters so largely into the construction of buildings, and this lack of knowledge is often shown by those who ought to know better. In the desire to get up a showy house, "something that will take, you know," mistakes are too often made, which are usually paid for by the loss of health and sometimes by the sacrifice of the lives of those who inhabit them. Is it difficult to call to mind houses that people call "unlucky places," in which an unusual number of persons die? These "unlucky places" are for the most part nothing more or less than damp houses, resulting usually from the employment of porous bricks in the construction of the walls.—*Charles T. Davis, in American Architect.*

When you are filing a saw and the file gets gummed up don't try to work with it so, or throw it one side and get a new one. If you have no card to clean the file, take a piece of pine wood three-fourths inch square by three or four inches long. Rest one end of the file upon the bench; with the little stick strike the file nearly edgewise with a square corner of the stick, following the slant of the teeth. This will clean a file nicely and without causing half the wear that a card would. A little practice would enable you to clean a file in half the time it would take you to hunt up a card-cleaner.

Getting up Stairs.

"If there is anything I like to see in a house," said Mrs. Domibus, "it is a handsome pair of stairs. We don't expect ours to be gorgeous or magnificent, but I want everybody who comes into the house to throw up both hands in admiration and exclaim, 'how lovely!' when they see the stairs. You see they are the first piece of furniture to be seen, and if they are all right it is no matter how plain the rest of the house is."

"You wish the stairs to be in the front hall, then, do you?"

"Why, of course! what else is the front hall for? Where else could they be? and what would the chambers be good for without a front pair of stairs?"

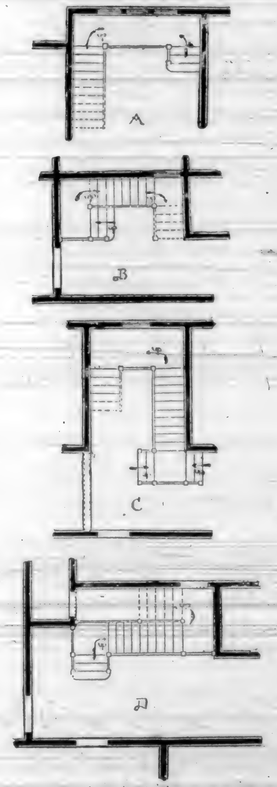
"Do you like a straight run?"

"I don't know what a 'straight' run is, but if you mean stairs without any turns or landings, I don't. How many kinds of crooked runs are there?"

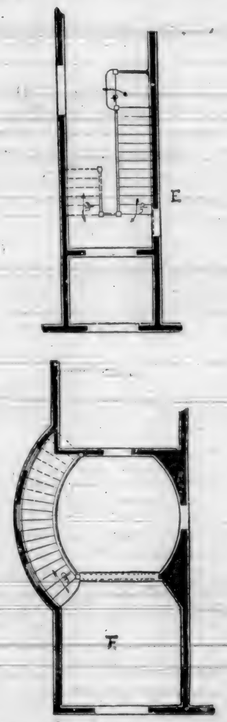
"Hundreds of them."

"Will you show me a few?"

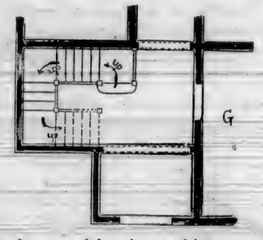
"Certainly. 'A' is a staircase that could



only be used with good effect in a large central hall or reception room. You go up three or four steps to a long, level platform, reaching quite across one side of the apartment, at the other end of which platform, you turn to the left again and complete the ascent. There are windows on this long landing, and it will serve various useful and ornamental purposes. In 'B' the stairs occupy a sort of recess or alcove at one side of the common entrance hall or passage way. You have a few steps to the first full landing, then several more to the half landing near the top, from which another short run carries you to the second floor. 'C' looks two ways for Sunday at the start. From whichever way you approach the stairs you can reach the first landing without turning a corner. The second landing is high enough for a door underneath it, and, if it happens to stand next an outside wall, for a window above it. 'D' is still more aggressive as regards room. The foot of the stairs is thrust forward into the wide hall and after turning once to the right on your way to the broad second landing, which is also high enough for a door underneath and a window overhead, you right about face sharply to the left for the



rest of the upward march. 'E' is the conventional, long, narrow hall with staircase clinging to one side of it. This is a variation from the familiar individuals of the class, inasmuch as it starts with a square landing at the bottom, runs up towards the front door instead of from it, and turns on itself by means of a landing near the top that spans the hall and makes an apparent division between the vestibule or the front end of hall and the interior portion. 'F' you might call a straight



crooked run, and by virtue of its many doublings it makes a comfortable sort of staircase in a limited space."

"Well, now, which of these will look the best?"

"That will depend mainly upon how they are treated by the architect who designs the details."

"And which will be most suitable for our house?"

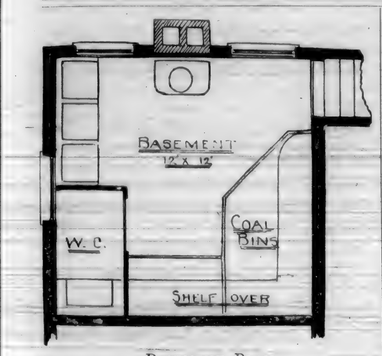
"That will depend entirely upon the plan, for, please remember, the stairs must be made for the house, not the house for the stairs."—*Builder.*

Wood Carving.

The hand carving of wood for house finish and interior decoration is becoming a distinct and permanent branch of industry. Much of this work has been done by amateurs as a pastime, but it has lately developed, to a considerable extent, into a "trade," industrially speaking. For fine furniture the carving of wood has for a long time had a place, but there appears to be a prospect that to the joiner's shop and work will be added those of the carver as a means of finishing interiors. Foreign workmen, at present, comprise the larger part of the workers in this industry, but the attention of our native workers has been directed to it, with the result of bringing it into general notice.

The idea that artistic hand work should be confined only to rare and costly material is hardly consistent with the demands of taste.

In the woods there is scarcely one that will not be beautified by hand carving. So common a wood as white pine is susceptible of producing very fine effects even when the wood is left in its natural condition. When first worked, it is a creamy white well calculated to show the shadows of relief; and exposure to the air soon deepens its tint. A thin varnish of shellac will tone its whiteness without producing a shiny surface. White wood is also a wood well adapted to carving, and the yellow birch is even finer. To these light colored woods may be added the three varieties of maple and also beech. The darker woods admit of bolder work—greater relief—and when united with the lighter colored woods make a fine combination. Carved white wood as a cornice for a room, the figures only slightly



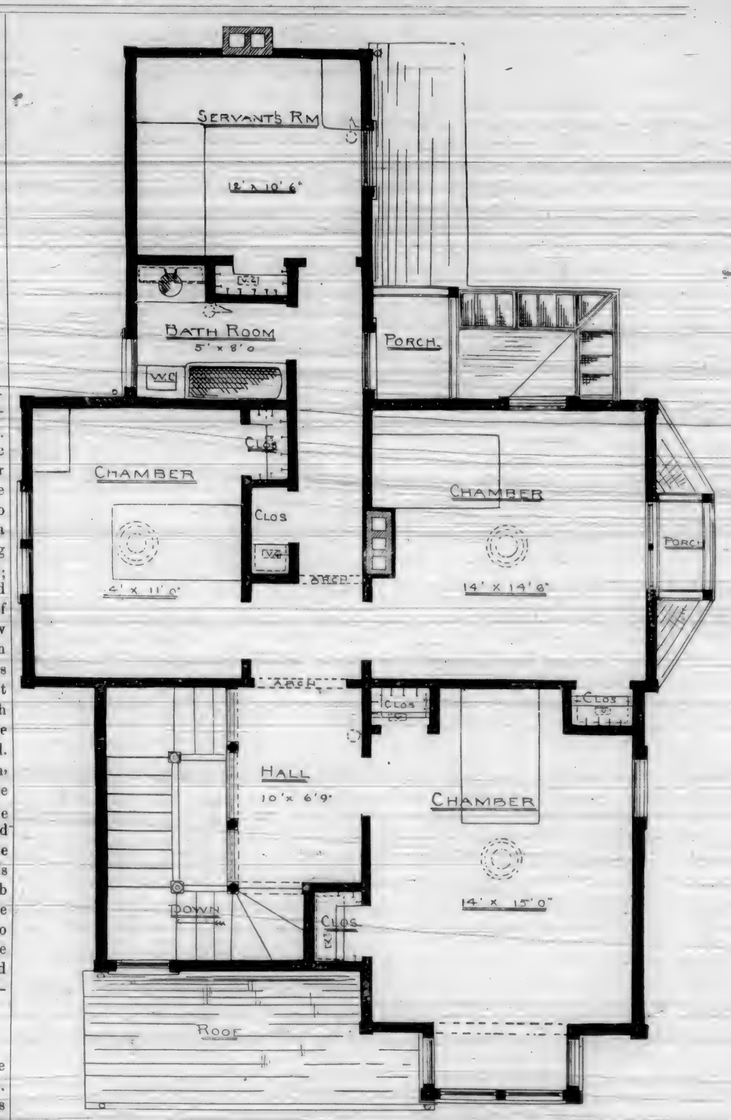
Basement Plan.

cut in, with cherry for the projecting moulding, produces an elegant effect in a parlor. The only finish is a thin varnish of shellac dissolved in alcohol, no touch of sandpaper being allowed to subdue the sharp cuts of the carving tool. There is scarcely any limit to the possibilities of wood under the hands of a skillful carver; straight lines and sweeping curves are not alone among its capabilities; it may be fretted, diapered, dentaled, and stippled, and cut into fine cross-hatcheling, if the workman has good tools and knows how to use them. As this is written, there lies on the desk a piece of butternut wood six inches long and about one inch diameter, that is cut into a triple spiral, of about three turns, each spiral being round and about the size of a rye straw. This shows the capabilities of wood.

Wood carving is a pleasant occupation, combining the attraction of taste with the pleasure of work. In many instances the carver is his own designer; it is better so, and the business is incompletely learned where the carver cannot originate, or at least design, his own work. The designs for an elaborate job are usually two, a plan and a profile. The profile is drawn in differently colored lines to indicate the relative depth or projection of the parts. The business offers an attractive field for workers who are artistically inclined.—*Scientific American.*

Where Grindstones Come From.

The grindstone makers of Nova Scotia live principally on the shore of the Bay of Fundy, and when the tide has receded and the reefs are left bare, they go down on the reefs with their tools, and blast out the rocks in as large pieces as may be. They then cut large holes in opposite corners of stones, smallest at the top, and put in "Louis bolts" with chains attached. These chains are set up on bars so that as soon as the tide rises enough to cover the rocks, a large boat called a "joggin" boat is floated over the rock, and the two chains brought up on each side of the boat are fastened to a stout pole which lies across the boat and projects over the sides a foot or two. The tide rapidly rising straightens the chains and lifts the rock from its bed, and the boat with its heavy burden—sometimes ten tons—is floated toward the shore, and when the tide attains its full height and the boat is as near the shore as is practicable, the stone is cut away by a few vigorous strokes of the axe on the middle of the pole, and the liberated boat jumps nearly out of the water. As soon as the tide recedes far enough to lay the rock bare, the men go to work with their tools and work them off into the shape we see them here in our large factories, and the smaller pieces are roughly "scabbled" off into the semblance of a small grindstone and then taken to the building, where they are turned in lathes by steam power and assume the finished appearance of the grindstones we see any day about us.—*Sel.*



Second Floor Plan of $5,000 Country Dwelling.—See "Our Illustrations."

A Few Hints about Sound Castings and Factors of Safety.

So MANY disturbing elements intervene between the conception of a design in cast iron and the completion of the work in the building, that we all have to allow what we call a factor of safety (aptly characterized by the late Alexander L. Holly, C. E., as a factor of ignorance), to cover these contingencies, varying from three or one-third the breaking strain in very simple cases where the quality of the castings can be depended upon, to five or even ten where the design is more intricate or the liability to shrinkage strains, hidden defects in the castings, rough bearing surfaces or uncertain variations of the load are possible. Much can be done by designers of cast-iron work to reduce this factor of safety, and consequently the weight and cost of castings, by giving serious consideration to the many processes and changes of condition through which their designs pass on the road to the building.

Foundrymen exercise great ingenuity in producing any design in iron that may be presented to them; still it is possible to design things that are totally impracticable in cast iron, in which case the designer would probably be asked to modify his drawing; but when it is possible to carry out a design without change, it is the almost universal practice to do so without comment and without recollection of the fact that the resulting castings may have very serious shrinkage strains or other defects, which would reduce the strength far below what the designer expected. For instance, a column, say sixteen feet long, eight inches in diameter, three-quarter inch metal, is sometimes designed with a heavy projecting base moulding near the bottom, say twelve or fourteen inches in diameter, giving three inches or more thickness to the metal at that point, also having an extension of the shaft to pass down through a shell plinth or pedestal, while at the top there is a shell cap and then a shelf, say twelve by twenty-four inches, for girders, made, possibly, two and one-half or three inches thick, to insure strength without the use of brackets or ribs.

This, like all other architectural work, will be moulded in "green sand," which is moulding sand slightly dampened with water and rammed solidly around the wood pattern, forming a mould strong enough to withstand the wash and pressure of molten iron running into the mould. When we consider that iron weighs four hundred and fifty pounds per cubic foot, while water weighs only sixty-two and one-half, an idea may be formed of the strength of mould necessary to stand the wash and pressure, which, in a mould three feet high from the bottom of the casting to the top of the gate where the iron is poured in, is 1,440 pounds per square foot, nearly three-quarters of a ton on each square foot of surface; consequently the sand must be firm.

Now, realize that the pattern for this sixteen-foot column is made sixteen feet two inches long, to allow for shrinkage; also, remember that when this shrinkage occurs, something has got to give. The shaft of your column being only three-quarters of an inch thick, will solidify and commence to shrink, while the metal in your heavy base moulding and the shelf at the top is still fluid, and a little metal will run out into the body of the column as it draws away in cooling, leaving a little vacancy or depression in the upper part of the shelf or base. Presently these heavy parts will become about the consistency of cheese, but the shaft of the column keeps on cooling and getting shorter. Now the situation becomes serious. The soft metal in the base and shaft is not solid enough to allow the column to draw them bodily through the sand mould, so they stay where they are and the column shrinks away, stretching out more of the soft metal after it, making a weak place or leaving a nice little crack to be filled up with putty before the column is painted, and in an extreme case pulling away so much that the head will drop off when the column is hoisted out of the mould. Then the foundryman looks wisely at the column and says: "Now I will fix you," and puts a fillet around below the shelf, or a bracket, which will cool quickly and help pull, chipping out the bracket when the column is cold.

In case all these fail, he just lays in some cold pieces of pig iron before closing the mould, and they cool the heavy places off rapidly, and everything is lovely. This last makes the soundest job in the lot, as they all melt down together; still there is liable to be dirt on the surface and shrinkage strains that would not be there if the designer had made his metal in the shelf only one and one-quarter or one and one-half times as thick as the shaft, put in some strengthening ribs or brackets, and had also made his whole base shell, except a small bead or fillet, thereby justifying a smaller factor of safety and allowing all parts to cool at the same time. Mullion columns are often designed with a heavy square face cored out, which stands in front of the wood frames, while a thin web runs back between the sash weight boxes. This is an exceedingly hard shape to cast without shrinkage strains. The cored part in front only radiates heat from one side (the core being quickly heated through), while the webbed back runs away off towards the remote parts of the mould, giving off heat on both sides, and the extreme back edge radiates in all directions but one, thereby cooling much faster than the front part, so that when the back has attained its length for normal temperature the front is still red hot and much longer. When the front cools there results a strain, which gives this column all it can do to hang together until it gets into the building, without doing its full share of work after getting there. Moral: A good liberal factor of safety, or a nice large rib of metal, round or square, on the back of the web to keep it from cooling too fast.

The privilege of modifying the thickness of parts of castings to avoid shrinkage strains is one that a designer can safely give a foundryman, for it is always cheaper to make castings right than wrong to commence with. Still, any foundryman can call to mind numerous instances in which he has received serious rebuffs when he has volunteered advice which he considered good, to designers who did not care to hear it, consequently they are often backward about volunteering their opinions.

Unequal cooling and consequent crookedness of shell pilaster faces, frieze plates and light ornamental work is usually corrected by the foundryman without asking the designer's permission, as it is utterly impossible to get light work straight without providing for equal and uniform cooling. But in the manufacture of thicker pieces and parts intended to sustain loads of any kind, the foundryman never makes changes or asks permission to change, if he can possibly execute the work as per drawings received.

Generally speaking, a more intimate association between designers and executors of cast iron would result in a great saving of metal and a reduction of the factors of safety. Imperfect and unsound castings, owing to carelessness in the manufacturing, are much more rare than is generally supposed. Cold shuts from pouring the metal too cold; honey combs, dirt and scabs from soft or unclean moulds are quite rare, and never dangerous in the work of reputable foundries. Many more bad castings are made through an honest endeavor to carry out a design which is not positively the best thing possible for the place than from carelessness in the execution of the work.

Among the most noticeable indications of shrinkage strains in finished castings is crookedness. One side will be shorter, thereby giving the whole piece a crook, or in the case of wide plates they sometimes appear with the center perfectly straight and both edges "loose," or apparently too long for the center. The same may be said of the thin back ribs sometimes put on mullion columns. This comes from the apparently long parts cooling first, so that when the heavier parts cool afterwards the light parts are left too long for their places while the loss of strength incident to these causes is usually provided for by the enormous factors of safety used. Still, if designers would examine their castings carefully, they would soon be able to design forms not liable to these defects, and reduce their factors of safety accordingly.

Any foundryman will be only too glad to show designers of cast iron work, through his shops, and will be able to point out many important conditions affecting the success and quality of castings, which our space will not permit us to mention. We feel confident that as architects and designers of cast iron take a closer interest in the numerous processes of the foundry they will appreciate the fitness of and use cast iron more frequently.—*C. W. Trowbridge.*

Oliver Everett.

MANY of our readers will remember Oliver Everett, the Boston publisher, who did such an extensive business as a publisher in the early part of this century; the subject of this sketch is his grandson, and was born in Roxbury, Mass., on the first day of February, 1860.

In 1874, Mr. Everett moved to this city; here he became a member of the Lincoln School, graduating two years later, and immediately joined the High School.

Soon after his course of study was completed, he entered the office of Prosper Huerne as a student, remaining in that capacity for eight years. In 1883 he became a member of the firm of Huerne & Everett.

Mr. Everett may be said to be a Californian, for, although not born here, his education was acquired, and his architectural knowledge and experience gained in this city. He takes much interest in the meetings of the S. F. Chapter of Architects, and is one of its earnest members.

OLIVER EVERETT.

When to Advertise.

TO REAP in harvest-time you must first sow in spring, and the man who advertises only when times are good, does not receive half the benefit he would if he had invested in advertising six months previous to the influx of brisk times. If an advertisement is not heard from in six months, do not run away with the idea that the money paid for advertising is lost. If the medium is good, and the goods you offer are such as the people want, you will most assuredly get a good return for your money. If you advertise spasmodically, now here, and now there, you will get but poor return, but, if you get the proper medium—and this healthy and strong—your returns will be fully in keeping with your expenditure, and eminently satisfactory.

In "dull times" advertisements are scanned over more frequently than in the rush of a busy season. It is in "dull times" that nine out of every ten business changes are made, or plans matured for the coming season. In "dull times," too, it will be found that men are more readily impressed with the advantages which any new and lauded scheme may possess, because it is in pleasing contrast with their present unsatisfactory condition. The manufacturer who advertises largely through the "dull times" when his travelers are laid off, will find he has planted a crop at the right season, and his travelers, when they go forth for orders, will reap a rich harvest.

Nothing helps the traveler so much in getting orders as the fact that his goods have been well advertised in advance of his coming.

We say, advertise *all* the time; but if you must drop off, you had better do so in the busy season, for then your customers are buying from you constantly, and will know that you are alive and in the business; but if you pull in your advertisements when little or no business is being done, your customers are liable to believe that you are dead. At any rate, they will believe that you are not as much to the front as those who advertise their existence and desire to do business, and it is no secret that customers in all trades prefer dealing with a *live concern* rather than a dead one.

"Aciding" Files.

FOR the past two or three years there has been going on in New York and vicinity, and perhaps in other large places, a regular practice of buying old files—that is, files which have been worn out—and taking them to be, so to speak, rejuvenated. The process of doing this is to dip them in a very strong acid, which, while cleaning the file quite thoroughly, also eats away on the dull tooth to such an extent as to make it feel to the touch comparatively sharp. For serviceable work the file is practically useless; and we presume a number of our readers will be able to recall the time when a fair lot of files of a well-known brand was offered to them at a ridiculously low figure, and which they bought, thinking they had purchased a mine of wealth, and a few days after would have given just about as much as they paid for the files for a chance to meet the man who sold the goods.

We learn, on investigation, that the worn-out files in the shops of some of the large consumers are purchased by junk dealers, they paying 6½ cents a pound for the old files, which is just 5¾ cents more a pound than steel manufacturers will allow for the same files to be used as scrap and again worked into steel. To some of the large consumers of files it has been a subject of comment that such prices should be paid for this scrap, but when we consider the point that the junk dealers get at least a cent a pound more for them, we can readily see where the profit comes in to the junk dealer. As regards the parties buying at that price, they treat them to an acid bath, with perhaps a current of electricity sent through the acid to give it double strength, thereby producing a file which, though very black in appearance, appears to have a good tooth, and if it can be sold to the ordinary machinist or consumer, the venture pays pretty well. The party selling the files thinks he has made a handsome profit, and the consumer thinks he has got a bargain. As a rule, he is never called upon a second time, as the seller of the files would hardly consider it safe.—*American Machinist.*

Repairing Leaky Roofs in Rainy Weather.

CRACKS in the tin on a roof, or holes made by persons walking on the same, whose boots may have projecting nails in the heels, can be temporarily stopped by inserting over the broken place a piece of putty, upon which is placed a brick or some other weight. This is a simple and efficacious way to stop a leak during a heavy rain.

Another way is to cover the puncture with a cement made by thoroughly incorporating fine clean sand with white lead. Openings are easily filled with this mixture. Small openings require less sand than large ones.

Hand Saws.

It is amusing to look over the saws belonging to a gang of carpenters. There is the big saw used by the little man, the little saw and big man; the good saw, the poor saw and the "horrid" saw. Some of them are enough to make a man feel tired just to look at them. One chap has a nicely filed saw, the teeth well shaped, a regular distance apart, and with just set enough to clear itself. Ask that chap why he files the teeth in just that shape and he will answer you that his "father learned him to." That is about all the reason he can give. Not one man in ten can tell why he shows partiality to a certain shape of tooth for certain work. The same man, when he buys a saw, is stuck again. He looks the saw all over, rubs his fingers over it, squints along the teeth, looks very wise, and asks to see another saw. When he chooses one, he cannot tell why he took that particular saw, or give any good reason for his choice.

When we buy a saw, we like a half dozen to choose from. Don't take a saw unless the back is ground thin. A polished saw is the best; it does not rust as quick, and it runs easier when the lumber is inclined to bind. Take a saw by the handle and see if it hangs well. It should not feel "top-heavy," that is, the point feeling out of balance with the rest of the saw. See that the handle fits your hand; if it does not, you never will like that saw, and will swap it off at a pawn shop for an old thing half worn out. See if the saw blade has a good bluish tint. If it looks like cast-iron, you had better leave it for somebody else. Hold it up by the handle and tap it with your knuckle; a good saw will give out a peculiar ring which poor steel never possesses. Hold firmly by the handle and switch it quickly from side to side and the blade will give out that "crackling" sound which once heard will always be recognized as belonging to a good saw. Don't take a thick saw. The thinner a blade having the requisite stiffness, the better the saw. Avoid by all means a flabby or limber blade; they are not worth carrying home, except to lend. Let the "borrowing chap" take it once and he never will ask you for another tool. Now hold the saw nearly level with your eye towards the light, and see if it is "wavy." If it is—drop it. Granddaddy's rule in choosing a saw was to "stick the point of the blade through the handle;" if it "came out straight," it was a good saw. Try this test if you wish; if the saw stands the test, all right, but you may spoil an otherwise good blade. This is an unreasonable test; a saw was never intended to double up like a hoop snake.

A high tempered saw is the best. This is why the blue tint is preferable instead of the cast-iron complexion. We pick for a hard saw every time. Manufacturers would make them harder if they dared to. Hard saw blades stay sharp longer than soft ones, and of course they are harder to file. Most of the boys won't buy a hard blade; they don't know how to set them without breaking out the teeth, so they say a hard blade is "no good" and swap it off. Half the carpenters set a saw at the bottom of the teeth; they set out the whole tooth, and we have seen the bend extending into the blade. This plays the mischief. If the saw is not very soft the tooth breaks out. If it does not break out, it strains the blade and makes it liable to break. Set only the points of teeth. For high tempered saws, the spring set is good, but we believe the "hammer set" is the only perfect set known. Morrills' "perfect" set is the set for the craft but when we set a saw for a delicate cut, let the saw be either hand, band or circular, we go to a little anvil with a corner beveled off; have a little cone to lay the saw upon, and fasten by a thumb nut when in the right position. You can now revolve the saw upon the cone, and set each tooth with a little hammer as in turn they pass over the beveled corner. This cone business of course applies only to circular saws; half the time we do not use the cone, but it is a "good thing for strangers." Strike a very light blow upon the end of the tooth; strike at an angle of sixty degrees with the saw, and always toward the center of the saw. We file the saw before setting; other methods require filing last, as setting dulls them. Strike just hard enough to upset the tooth slightly. In very hard saws, this is what prevents them from breaking. The tooth changing form ever so slightly, relieves itself from the severe strain caused by binding over the short corner of the anvil, and it "takes a set," as it were, at the same time, which prevents it from springing back a particle. When the teeth spring back as in case of spring set, their truth is greatly impaired. For a six-inch circular saw, having teeth three-eighths of an inch deep, we should not let them project over the corner of the anvil more than one-fourteenth of an inch.

Hand saws are no exception to the same rule, and work much better when the set is all in ends of the teeth. Sometimes we hear a man say that the set all works out of his saw. Just tell him to put the set where it belongs—in ends of the teeth, and it will stay where he puts it. Don't set a saw too much. It is waste of time, saw, and lumber. When you see a chap cutting up lumber with a saw, cutting a kerf one-eighth of an inch wide, you had better set him to work learning to file and set a saw. A sharp saw with ground back needs very little set. Eight out of ten users of saws can't file them. There is no other tool used by wood-workers which has such a fuss made over it in regard to being kept in order. Lots of men can put a saw in the clamps, rub a flat file over ends of the teeth, and then file them up sharp; but there their knowledge ends; they follow the shape of the teeth. If a tooth is bad shape it keeps that shape, only it gets "more so." The teeth get big on one side and small on the other. For a space they are huddled, then the next two inches seem to have lost a tooth. One side will be filed much more fleaming than the other side. No matter what saw it is, circular and band saws are not excepted, and all have to stand the same racket. Good files are few and so are good workmen. It is with a saw as it is with everything else; to be a good filer you must exercise care, and much care too. Good filers seem to take to it naturally. They don't know when they learned to file a saw; it seems as if they always knew how. Watch them closely and you will see that they are just as careful with the file as they are at the bench. They have their pet shape for the teeth of different saws, and they keep them that shape. They never "just touch up" a saw by going over it in a hurry and dubbing off the points of the teeth; when they file a saw, it is filed right. When they get a tooth to a point, they stop; they don't give another stroke with the file and take the point off, or round over the end of the tooth. When they get done, the saw is straight. Sight across points of the teeth and you can see them all. Now lay the saw flat upon a smooth board, take an oil stone and draw it the whole length of the saw upon the sides of the teeth; this will take off the feather-edge or burr from each tooth, and it then makes the saw cut nice and smooth. Be sure to rub the stone toward the handle; if rubbed the other way it is apt to bend the burr over without removing it.

It is impossible to convey without illustrations the exact shape for saw teeth. That there is a "best shape" everybody allows, but also all claim it as theirs. For cross-cutting file to an angle of sixty degrees "fleaming," and vary angle of back of the teeth with the hardness of the wood it is destined to cut. For very hard dry wood file back of tooth square across. For live or green lumber fleam back of the tooth just like the front. The teeth may also have a little pitch forward or be a little "hooking" for soft wood. Rip or splitting saws are not usually filed hooking enough. Many people file front of tooth perpendicular, the back at thirty degrees; hook the tooth five, or even ten, degrees more, and it will do much better work. File back of teeth square but fleam fronts a little. Where the same saw must be used for both hard and soft ripping, file front fleaming and back square. A compass saw is always a much abused article. Who ever saw one, unless just out of the shop, but what was badly bent, or else bent "clean in two"? Just take a compass saw and change the teeth all over. Make them hook toward the handle instead of toward the point. Set the saw nicely, file square back, and slightly fleaming front, and that saw won't bend up double the first time you try to saw with it. The Japanese seem to know a thing or two about saws and they make all theirs to cut when drawing towards them. Don't ever try to work with a dull saw. Just get into a barber's chair, let him shave one side of your face with a nice sharp razor, then let him open an oyster or two with it, and shave the other side—you will know all about sharp and dull razors and can apply the same knowledge to saws with perfect satisfaction. Take a hand saw that has been filed seventeen times without jointing, it goes jumping and rattling through the cut, gouging here and slipping there, till you wish the devil had it, yet a circular saw gets used in the same way, all the cutting done by three or four teeth, causing it to buckle, rattle in the cut, and, perhaps, catch, fly to pieces, and kill somebody. The learned coroner's jury will render a verdict of "death caused by disintegration of the steel composing the saw," and that will end the matter.—*Lumber World.*

Sending Logs down Nevada Mountains.

A chute is laid from the river's brink, up the steep mountain to the railroad, and while we are telling it, the monster logs are rushing, thundering, flying, leaping down the declivity. They come with the speed of a thunderbolt, and somewhat of its roar. A track of fire and smoke follow them—fire struck by their friction with the chute logs. They descend the seventeen hundred feet of the chute in fourteen seconds. In doing so, they drop seven hundred feet perpendicularly. They strike the deep water with a report that can be heard a mile distant. Logs fired from a cannon could scarcely have a greater velocity than they have at the foot of the chute. The average velocity is over one hundred feet a second throughout the entire distance, and at the instant they leap from the mouth their speed must be fully two hundred feet per second. A sugar-pine log sometimes weighs ten tons! What a missile! How the water is dashed into the air! Like a grand plume of diamonds and rainbows, the feathery spray is hurled to the height of a hundred feet. It forms the grandest fountain ever beheld. How the waters foam, and seethe, and dash against the shore! One log having spent its force by its mad plunge into the deep waters, has floated so as to be at right angles with the path of the descending monsters. The mouth of the chute is, perhaps, fifteen feet above the surface of the water. A huge log, hurled from the chute, cleaves the air and alights on the floating log. You know how a bullet glances, but can you imagine a saw-log glancing? The end strikes with a heavy shock, but glides quickly past for a short distance; then a crash like the reverberation of artillery, the falling log springs, vertically, into the air, and with a curve like a rocket falls into the water, a long distance from the log it struck.

Amyl Nitrite in Opium Poisoning.

According to *L'Union Medicale*, a patient who had taken two ounces of laudanum, who was in a comatose condition, with pulse beating only six times per minute, and upon whom belladonna and other remedies had produced no effect, was aroused by inhalations of amyl nitrite, and finally recovered.

Who Made the First Barrel.

Few inventions have had a wider or more varied usefulness than the barrel; few give such promise of perpetuity. Unique in principle, simple, yet singularly perfect in plan and structure, the barrel is a little less than a stroke of genius. Who set up the first one? Who first conceived the happy thought of making a vessel tight and strong out of strips of wood bound together with hoops? And when did he live?

No history of inventions; none of the encyclopedias in our great libraries; no historian of human progress, so far as we know, gives any information on the subject, unless we accept the Roman author, Pliny, who mistakenly attributes the invention to the Gauls who inhabited the banks of the Po. We say mistakenly, since there is the best of good reason for believing that the barrel was in use long before the Gauls took possession of their Italian home, perhaps long before the Gauls existed as a people.

The monuments of Egypt furnish proof of the early use of hooped vessels, though no date is given for their invention. In one of the inscriptions copied by Wilkinson may be seen two slaves emptying grain from a wooden vessel made with hoops, while a scribe keeps tally, and a sweeper stands by with a broom to sweep up the scattered kernels. Close by, an unfortunate is undergoing punishment by bastinado, for short measure, perhaps, or, as Mr. Wilkinson suggests, for petty theft. The measure is barrel shaped, and precisely like the *kayl* of modern Egypt. It would hold, apparently, about a peck. Unfortunately, the age of this inscription is not indicated. Measures of the sort would seem to have been in common use very early in Egypt, though not for the storing of liquids, for which purpose skin and earthen vessels were employed.

At first thought, Egypt would be the last place to look for the invention of hooped vessels, its arid climate making it specially unsuited for their employment. Possibly, however, that may have been the compelling cause of their invention.

Throughout the East, the bamboo is largely used for making hollow vessels, a section of the stem through a node securing a solid bottom, and one between the nodes an open mouth for a natural tub or bucket. In well wooded regions, nothing would be more natural than the employment of hollow tree trunks for the same purpose, or sections of tree stems, hollowed out by fire or otherwise. In drying, such vessels would split and spoil, and it would require no great genius to repair them by means of withes or wooden bands, the primitive form of the hoop.

If the users of such natural barrels should migrate to a region where timber was scarcer, economy of lumber would be likely to suggest the building of barrels from pieces artificially split; in short, the use of staves, by means of which the primitive cooper would be able to make several barrels out of a block that would suffice but for a single dug-out.

But this is speculation merely. It is enough to know for a certainty that the cooper's art, like the potter's, is one of extreme antiquity. We had no suspicion of its venerableness when we began to trace its history in response to the inquiry, Who made the first barrel?—*Scientific American.*

Truing a Grindstone.

Lay a flat iron bar across the grindstone frame as close to the stone as possible without touching. Take a piece of three-fourth gas pipe two or three feet long, and hold it about 45°, with the end resting upon the iron plate. Roll the pipe slowly across and against the face of the stone, holding the pipe firmly to its place, so that the stone will bite upon the end of the pipe. The pipe will wear away, as well as the stone; rolling it will keep the end even.

Salfeld School of Architecture.

Mr. David Salfeld has opened a school for the benefit of architectural students, at No. 700½ McAllister Street. Apprentices and those wishing to obtain a knowledge of architectural principles should consult Mr. Salfeld. Mondays and Thursdays are the days upon which the class meets. Full particulars given by calling at the above address.

Architectural Iron Work Manual.

We have received from C. W. Strobridge one of the most complete and finely illustrated manuals, descriptive of Architectural Iron Work, that has as yet appeared on our desk. The first fifty pages are illustrated with designs for columns, pilasters, etc. Following are tables of strength and deflection of I beams, and text relating to the use of angles and T's as struts. Most of the tables in this work are entirely new. These manuals are intended for free distribution to parties interested in any way in building, and a copy will be forwarded to any address by writing to C. W. Strobridge, Room 408, First National Bank, Chicago, Ill., and mentioning the name of this Journal.

The habit of "swearing off" at the beginning of the year is a time-honored one. The retail dealer should "swear" that he will look close to his credit; that he will keep his stock well assorted; that he will keep his yard in good order. The manufacturer should "swear" that he will go slow all along the line—in the woods, and in the mill; that he will keep well insured; that he will bear in mind every day that pine stumpage is not so plentiful in the Northwest that it should be disposed of for a song. The wholesale dealer is between two fires; he must do the best he can, therefore it will not avail him much if he swear at all.—*Northwestern Lumberman.*

Purchasing and Using a Grindstone.

A CORRESPONDENT of the *American Machinist* writes: "When you find a stone that looks about right, take a mallet or block of wood and strike upon it in several places. If there are any cracks and shakes in that stone, you can 'hear them.' Turn the stone over and examine the other side. With a cold chisel and hammer chip off a thin scale. It should break between your fingers, and almost crumble when rubbed rather hard. If it is hard and flinty, or has any trace of slate or soapstone qualities, give it the 'mitten.' The stone should be almost soft enough to enable you to pare it with the cold chisel, graver fashion.

"When you have got a stone to suit, have the sides turned off for flanges. All stones used to be wedged true upon a square shaft. It was a barbarous, unscientific practice. Dry pine wedges driven in tight, then wet thoroughly, the stone run too fast, is entitled to burst.

"Before you wet the new stone, put a dog on the end of the shaft, water on the stone, and a 'cub' on the dog. Let him turn the stone, and increase the speed until the water begins to fly off. It will commence to fly first at the point where gravity begins to assist centrifugal force, right where the stone begins to ravel *down* from a point level with the shaft. Count the revolutions, figure up the speed, and put on a pulley to make the stone run about this speed. A little faster will not do any harm; the stone soon wears, and the speed of the surface decreases. When the stone gets worn two or three inches, put on a smaller pulley. Keep changing until the stone is eighteen inches in diameter. Then turn a groove in the center of its face three inches deep. Fit a lot of dry pine wedges into this groove. Don't drive them too tight, or you may break off a big chunk of the stone. Now take the stone off and lay it down in the water, or where the pine wedges will get wet. Next we k you can go there and get two nice eighteen by four inch grindstones, just the thing for up-stairs, where you do the light work.

"Don't put a nasty water trough under your grindstone. It only serves to catch dirt, mud, and any tool you may happen to drop. Put a long shaft in your stone. Have the pulley three feet at least from the stone, and a bearing close to it. Cover this box with a piece of leather, and you can keep grit out of it. Put the other bearing close up to the stone on the other side. No use to oil this box. Might as well oil a water-wheel step. Make the bearing of bronze, and rig a one-fourth inch water pipe to discharge a stream upon it. Centrifugal force carries the water to face of the stone, just where you want it. The bearing is always lubricated, and the stone clean and ready for work. It will work, too. Use it well and it will be the best tool in the shop, except its formidable rival, the solid emery wheel."

Bound Volumes of 1884 Now Ready. Price, Post-paid, $2.50.

Stirrups for Supporting Centers.

MR. CHARLES ACKERSON has applied for a patent for a newly invented stirrup for supporting side-walk and similar centers of arches. By its use all studding and timbering is completely dispensed with, thus saving cost of the stirrups on a single job. Much time is also gained, as it takes but a few minutes to place them in position. Mr. Ackerson proposes to sell the stirrups at a cost of twenty cents each, or will rent the same for use at seven and one-half cents each. In the latter case, the time allowed is that occupied by actual use in the building for which they are rented. By referring to the large ad. elsewhere in this issue, a cut and full description of these stirrups will be seen, and any explanation in regard to the same may be obtained from the manufacturers, whose names will be found at the bottom of the ad.

NEW PUBLICATIONS.

Mechanic's Geometry, or the Science of Framing by the Aid of Card-board Models. New edition of 1885. With the aid of card-board models, and the rules and explanations given, the mechanic can readily learn the method of getting the length and bevels of every description of rafters, hoppers, etc. Stair work is also treated in a manner that at once arrests the attention of the student, and becomes an attractive study. This book will also be found useful, though possibly in a less degree, to those who have already become mechanics, but who have not learned the science involved in their trade. The main object of this work is the elevation of the working man to the dignity of the master mechanic. Price, Five Dollars.

The Artisan, or Practical Methods That May be Applied to Works of Building and Other Constructions. New edition of 1885. Among the practical ideas in this work will be found the utility of the right angle, and its application in solving many useful problems. By means of a right angle the exact circumference of a circle is determined at once. It also shows a simple and correct method for the measurement of boards, floors and other surfaces. It is applied to lines of any length, and divides them into equal parts. It gives the cuts and lengths of rafters, braces, and other timbers in framing. There can be no doubt as to the value of a right angle and its utility in this connection. It is clearly illustrated in the *framing square*, a tool which solves nearly every problem in practical geometry. Price, Five Dollars.

Science of Carpentry Made Easy. The work, *par excellence*, for every mechanic to have in his possession. It is thoroughly practical in its character, and contains much information to be found in any other publication. It excels in its methods of obtaining the length and bevels of every description of rafters, both common, hip, and valley. Price, $5.00.

Builder's Guide and Estimator's Price Book. This work is chiefly intended to assist the Builder and Contractor in making estimates of the cost of work they may be competing for. It is written by the author of the "Steel Square and its Uses," which fact is a guarantee that the book is practical in its character. Price, $2.00.

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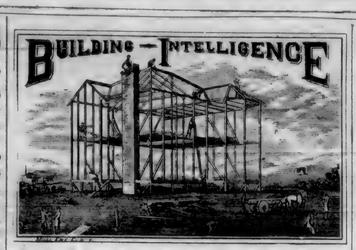

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AN UNPRECEDENTED SHOWING.

Quarterly Review of Building Operations.—An Average of Nearly 100 Buildings per Month.

THERE are two classes of operators who have as yet failed to be convinced that we have, or are now passing through, a dull season,—those who buy and sell real estate, and those who perform labor and furnish materials for improvements on the same. Indeed, the latter class have had no cause for complaint for the past three years. The reason for this state of facts will be evident to those who make a study of the

BUILDING INTELLIGENCE

As published monthly in the columns of this Journal. The number and value of the improvements recorded for the first three months of the present year, exceeds by

OVER ONE MILLION DOLLARS

The record of any similar period that has come under our notice. This statement becomes the more noticeable when we consider that the first three months of the year are generally regarded as dull months, owing partly to our rainy season occurring in that period.

LOW PRICE OF BUILDING MATERIALS

Has undoubtedly been the cause of much of this activity; but we must look deeper beneath the surface if we wish to get at the true reason. A careful analysis of our building reports will show that the number of individual owners is on the increase, and this is owing, more than anything else, to the

LOW RATE OF INTEREST ALLOWED BY THE SAVINGS BANKS.

People of limited means have found that a more profitable investment awaits those who build houses for rent, and so we see numerous small houses being erected by this class.

It will be noticed that in a portion of the buildings quoted the name of an architect does not appear. This must not be construed to mean that no plans were drawn for the same. On the contrary, in many instances plans were prepared by an architect, but the owner superintended the erection of the buildings.

The following tabulated statement will show the result of three months' activity in the building interests.

FIRST QUARTER OF 1885.

	Frame.		Brick.		Alterations.		Total.	
Jan.	62	$247,320	2	$314,000	9	$41,265	73	$602,585
Feb.	103	492,500	6	131,725	12	36,172	121	660,397
Mar.	79	318,232	5	467,565	10	20,482	94	806,279
Total.	244	$1,058,052	13	$912,290	31	$97,919	288	$2,069,261

A total of 288 buildings of the value of $2,069,261.

For the same time in 1884 there were recorded 198 buildings of the value of $1,014,315.

As yet there is no decrease in architects' offices for orders of plans, etc., and we may reasonably expect that the balance of the year will witness an increased activity. Plans for several large buildings are now under consideration, principal among which is the Donahue Building on First Street, and two fine buildings on Market Street, after the pattern of the Levi Block.

RAISE IN THE PRICE OF BUILDING MATERIALS.

During the past month the price of lumber has been raised to $14.00 for rough, and $30.00 for surfaced. This we regard as too low; for while it may benefit a few in the large cities, it is hard on those working in the woods.

Hardware has still an upward tendency. Nails that a short time ago were sold as low as $2.45 per keg, are now worth $3.25. Locks and fine hardware have advanced 20 per cent. In fact, prices are firm for everything connected with building operations.

Scarcity of Draughtsmen.

THERE is, at present, an absolute dearth of first-class draughtsmen. We have "tracers and copyists" in abundance, but detail draughtsmen are scarce. We keep a list of disengaged draughtsmen, and, by forwarding your name to this office, the best means will be adopted to hear of situations. No charge for registration.

A Badly Used Owner.

WE clip the following from the S. F. *Chronicle* of 3d inst: "We are in receipt of a communication from a gentleman who is putting up houses in this city and who writes to complain that he is constantly being swindled by collusion between his contractor and his architect. He specifies that he contracted for a brick foundation which was to contain 8,000 bricks, but by running up the outside wall only one brick in thickness and filling in the center with sand, the contractor managed to put up the foundation with only 3,000 bricks. He contracted for flues from each fireplace and stove-hole, but the contractor only gave him one flue to four fireplaces. He contracted for A-1 first-class rustic work and got the commonest kind of sapped wood. His original plan contemplated a front elevation, with elaborate ornamental work, but after the building had begun the architect altered his plan without notice to the owner and the contractor gave him a plain front without any pretense at ornamentation. Altogether, he seems to have been an ill-used man.

"At Chicago and Kansas City when they want to describe a champion scoundrel, they say he is as great a rascal as a building contractor. The expression has become proverbial. We presume it is much the same here. There are, doubtless, honest men in the business, but there are a good many who only escape the penitentiary by superior knowledge of the law. The remedy for victims would

seem to be, find out the honest few and employ them only. It ought not to be very difficult to pick them out."

That the foregoing is false in part, is self-evident upon the face of the statement; if founded on fact, the results complained of were well deserved by the owner, as it seems that he was not a novice in house-building, and his former experiences should have qualified him to select an architect worthy of trust and confidence. The brick story, using three-eighths brick and five-eighths sand, is a farce. Eight thousand bricks would lay but a small extent of foundation wall at best. If it was provided that the walls should be thirteen inches, the width of three bricks, there would be the *extreme possibility* of facing up with brick on the two sides, and filling the center with sand, which, if practiced as an entirety in the full extent of the wall—a something that could not very well be done—the displacement of brick by the use of sand would amount to but *one*-third of the whole; but as the footing courses were likely extended full thickness, and the top covered with brick to hide the sand, about the worst that could be done would be one-fourth per cent. sand, instead of two-thirds per cent. Hence the silliness of the yarn.

But it is common in foundations of 8,000 brick in extent, to make the walls but nine inches. the width of two, or length of one brick, in which case a chamber for the deposit of any amount of sand would not exist. And the whole story in this particular would be a shallow brained misstatement. In either case, the brick matter is a high colored story.

If the architect did as is represented, the fact is clearly shown that he is, or should be, classed among the *architectural shysters* that disgrace the profession. Certain it is that no reputable architect would be guilty of any such nefarious work, and our contemporary is at fault in not ascertaining the names of the guilty parties, and publishing them in full; a course that this Journal would and will yet pursue, if the names are made known to us, and anything like the published statement shown up as facts. This is a duty we owe to the profession as a whole, and to its honorable members individually. It is also greatly at fault in giving publicity to an indiscriminate statement, calculated to impress upon the minds of the uninformed that architects, as a class, as well as contractors, are dishonest and tricky; all of which is grossly wrong, as there are many architects in this city, and contractors too, whose moral and business rectitude will stand the test of comparison with an equal number in any other profession, with no fear of shrinkage should the comparison be carried into the sanctum sanctorium of some newspaper publication.

If an owner, "the first time he builds," happens to be beguiled into a *scalper's* office, he is rather to be pitied than blamed, provided he has not drifted there in hunting up one of those precious frauds, a "cheap architect;" one willing to give his services (!) at any price that may be offered, relying upon after possibilities to "get even on the owner;" whether by substituting sand for brick, or any other villainous device practiced by those who are alike destitute of a proper knowledge of architectural science, and all principles of integrity and honor. And the fact, if fact it be, that "an owner" has been as badly used as the article under notice states, is not a sufficient reason why the whole profession of architects and contractors should be slurred and slandered.

OUR ILLUSTRATIONS.

A warehouse designed in San Francisco, to be erected in Baltimore, Md.; Wright & Sanders, Architects.

A California home; D. Salfeld, Architect.

On page 39 will be found the elevation of a five-story brick building, to be erected in Baltimore, Md., for A. B. McCreery. Both the owner and Messrs. Wright & Sanders, the architects, are inhabitants of this city, and it most certainly speaks volumes for our architectural talent, when an owner gives an order for plans for a building to be erected in a city of such prominence as Baltimore.

On page 41–47 are the plans, elevations, and details of a dwelling representing some of the latest phases of architecture as exemplified by a California architect. Credit for the same belongs to Mr. D. Salfeld, of the firm of Salfeld & John, architects. The happy combination of wood and brick as presented in the elevation, forms a pleasing contrast to the "rustic" fronts, so common in every portion of this slope. If good judgment is exercised in the selection of colors with which the woodwork is painted, and if judicious care is exercised in the planting of trees and shrubs around the house, a very pretty and comfortable home can be had by the adoption of the plan as shown.

By referring to the details, it will be noticed that the architect has shown the ends of the rafters with moulded projections worked on the timber itself, thus combining economy with beauty and solidity. All the different parts of the framed woodwork are to be morticed and tennoned together, except the intersection of the collar beams with the rafters. These are nailed as shown in engraving; the construction of the exterior is well shown in the various details.

The first floor plan possesses a few features not usually shown in country dwellings. The combination of the hall with the living and dining room by means of the sliding doors, and the direct communication between the parlor and dining room, makes the plan an attractive one, especially to those who are fond of much company. The toilet shown in entrance hall, the arrangement of the kitchen and pantries, the easy access to all the rooms from the rear hall, are features worth studying.

The rooms in the second story are amply provided with closets, windows and the other necessaries needed to make a comfortable home.

COST.

In the estimate of cost, the following prices of labor and materials are given, so that by comparing the same with the prices of corresponding items in various parts of the country a definite idea may be gained of the cost of the design shown; it must be borne in mind that prices are given as they rule at the time of the issue of this month's Journal; these of course are subject to various fluctuations.

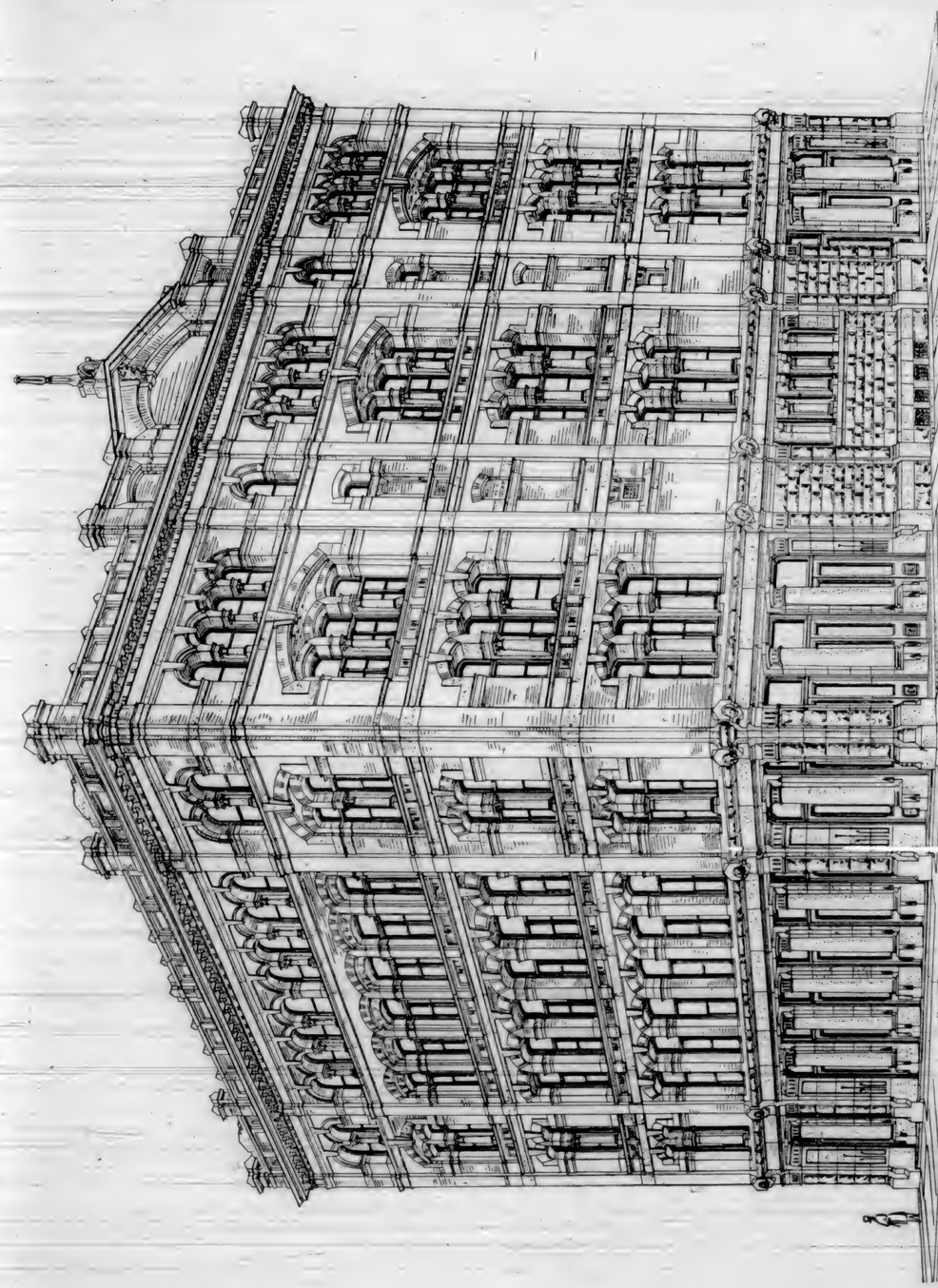
Rough lumber (pine)	$14.00 per M
Flooring (pine)	$25.00 " "
Stepping (pine)	$35.00 " "
Rough lumber (redwood)	$16.00 " "
Surfaced (redwood)	$30.00 " "
Rustic (redwood)	$30.00 " "
Shingles	$2.00 " "
Laths	$3.75 " "
Brick	$9.00 " "
Lime	$1.50 per bbl.
Cement	$3.75 " "
Carpenters	$3.50 per day
Plumbers (with helper)	$6.00 " "
Plasterers	$3.50 " "
Masons	$4.00 " "
Laborers	$2.00 " "
Lathers	$3.50 " "
Painters	$3.50 " "
White lead	6½ cts. per lb.
Boiled oil	70 " " gal.
Plastering	28 " " yd.

The above includes about all items necessary to arrive at a definite conclusion in regard to the cost; $7,000 will be required to finish the dwelling as per plans shown; that is, according to rates as published above.

There Should Be Work for All.

A GENERAL reduction in the hours of labor throughout the country would give constant employment to all, whereas, at present, hundreds of thousands are compelled to walk the streets or tramp through the country in the vain pursuit of work. Monopoly is frank enough to say that too much has been produced, and that it must unload before the wheels of productive machinery are again set in motion. When it answers the purpose of capital as at present to reduce the hours, how readily workingmen accept the situation. Wages for a season would be a trifle under that paid for more hours, but the compensating demand for labor would soon bring the pay up to the standard of present rates.

Very little intellectual improvement will take place among our working people while all their vital energies are exhausted by the continuous strain which over long hours of routine toil exact.



DESIGN OF WAREHOUSE FOR A. B. MCCREERY. TO BE ERECTED IN BALTIMORE. DESIGNED BY WRIGHT & SANDERS, SAN FRANCISCO.

"Fire Limit Ordinance" vs. "Building Laws."

As at present manipulated, fire ordinances and the building laws of San Francisco are mixed up as one, with the board of fire wardens, the chief engineer of the fire department, his aids and deputies, and others within the fire department circle, as the sole exponents and executors of said laws and ordinances.

While there is a co-relationship between the practical results of the architectural and building sciences, and the study and knowledge of security from the destructive element, - fire; safety to those who so often imperil their lives combatting the fury of devouring flames, there is a difference between the two so vast and emphatic that the laws and ordinances regulating and defining limits and procedures, should be distinct and separate to each, and respectively,—placed under the control of men qualified by education, contacts and experiences, to understand, manage, and determine all issues and necessities in each department respectively.

The standard of intelligence and experience that perfects a thorough knowledge of things "combustible," "inflammable," "explosive," etc., and qualifies for all the duties and understandings necessary to, and involved in connection with a well regulated fire department, as a rule, and generally, is entitled to but little consideration in architectural and building matters. There is but incidental assimilation of thought and study, and when mixed up under one control and dictation, discordancies are inevitable. Hence the necessity of

A "BOARD OF PUBLIC WORKS"

Composed of intelligent, competent and qualified men, capable of understanding and determining not only all principles of strength and safety in the construction of buildings, but all other matters of sanitary and other material import, which should be under legal control and regulation. As now regulated, the conglomerate fire and building ordinances contain many provisions which should be illuminated, for the reasons that they are unnecessary and more than reasonably restrictive; many of them are "dead letters" seldom observed, yet ever at command when for reasons their enforcement may serve purposes.

We do not mean by this article to impune the motives, or question the integrity of those managing matters as now regulated, but to call attention to the error which manifestedly exists in the combination of laws and ordinances as they are at present. A "board of public works," we hold, is a necessity in this city, and should exist, with full jurisdiction over all questions and matters involving the building interests. In very many of our Eastern cities, such boards perform the duties suggested, to great public advantage, and without conflict or disagreement with the fire department regulations,—the two managing their affairs separately, yet in harmony, as far as the interests of either are concerned; and so it should be in San Francisco.

Shoddily Built Houses.

They are numerous in San Francisco, mainly because they suit a large number of owners who prefer them to well and properly built houses, not upon the score of shoddiness, but because they are "cheap"—*cheap* as to *first cost*, quality being an unconsidered factor in the matter. It is simply strange how so many otherwise intelligent men and women can be persuaded to accept the bad, as good, inferior as excellent and satisfactory, upon the catch penny idea of cheapness. Almost every owner, in making first statements to an architect, premises by saying that they want a house "well built, strong, and with all modern improvements," and in a majority of cases, if the man of plans states the actual facts of cost for the house outlined, the owner is discouraged, and withdraws to seek another who will promise more at less cost.

In this way a class of disreputable men have met encouragement, and make pretense to architectural skill, while, in fact, mere *shoddyists* in both architectural and constructive senses. Yet people like this degeneracy in house construction so well that thousands have mere shells for houses, with so many manifest defects that the pleasures of ownership are greatly compromised, and sometimes rendered so unpleasant and unbearable that escape is sought by *"this property for sale,"*—reasons not mentioned.

Pressure per Square Inch.—Bricks intended for substantial buildings should stand a pressure of not less than 6,000 pounds per square inch. For public buildings, where the brick will necessarily have to bear a great weight, they should stand a pressure of not less than 7,000 pounds per square inch. Government contracts are often awarded to parties manufacturing brick that withstand a pressure of from 8,000 to 10,000 pounds per square inch.

Most people think an iron mast is cast and solid, and wonder why its weight doesn't pull it up by the roots, or punch a hole in the bottom and slide through. This shows how easy it is to be mistaken, says an exchange. An iron mast is really lighter than a wooden one. A 60 foot stick of spruce or yellow pine, 2 feet in diameter at the base, weighs far more than the shell forming the modern iron steamship masts. These masts for the *Atlanta* will be fine specimens of their kind. The mainmast is 2 feet in diameter at the base, tapering to 17 inches at the top, at which point the funnel will be fashioned square, making a marked distinction from foreign-made masts-heads, which are left round. The mainmast is 68 feet 4½ inches in length, and the foremast 2 inches shorter. The method of construction is peculiar. Three T shaped rods of steel, the length of the masts to be made, are affixed, base outward in circular wooden frames, and around the skeleton thus formed the ready shaped plates are riveted in place. The plates are 12 feet in length and about ⅜ of an inch in thickness.

Building Improvements in Woodland.

Woodland, March 4, 1885.

To the editor of the "San Francisco Architect and Building News:" The following is a synopsis of the building and improvements of Woodland and vicinity for the first three months of 1885, ending with March 4th. So far the building interest has exceeded our expectations, and surpassed in amount of capital any previous quarter.

In connection with the steady demand for new buildings and extremely low price of lumber and builder's hardware, many have been induced to start in and take advantage of the favorable times, and we can safely say that business is good.

Carpenters and joiners are hurried, brick layers and plasterers are rushed, painters and paper-hangers are busy, while material men are perfectly happy, and the consumer reaps the benefit. Under such circumstances who should object.

The number of buildings and improvements of all classes is:—

CITY.

	COST.
13 Frame Buildings	$18,800
4 Brick Buildings	38,400
11 Improvements and Alterations	14,800
Total number, 28 buildings; total cost	$72 000

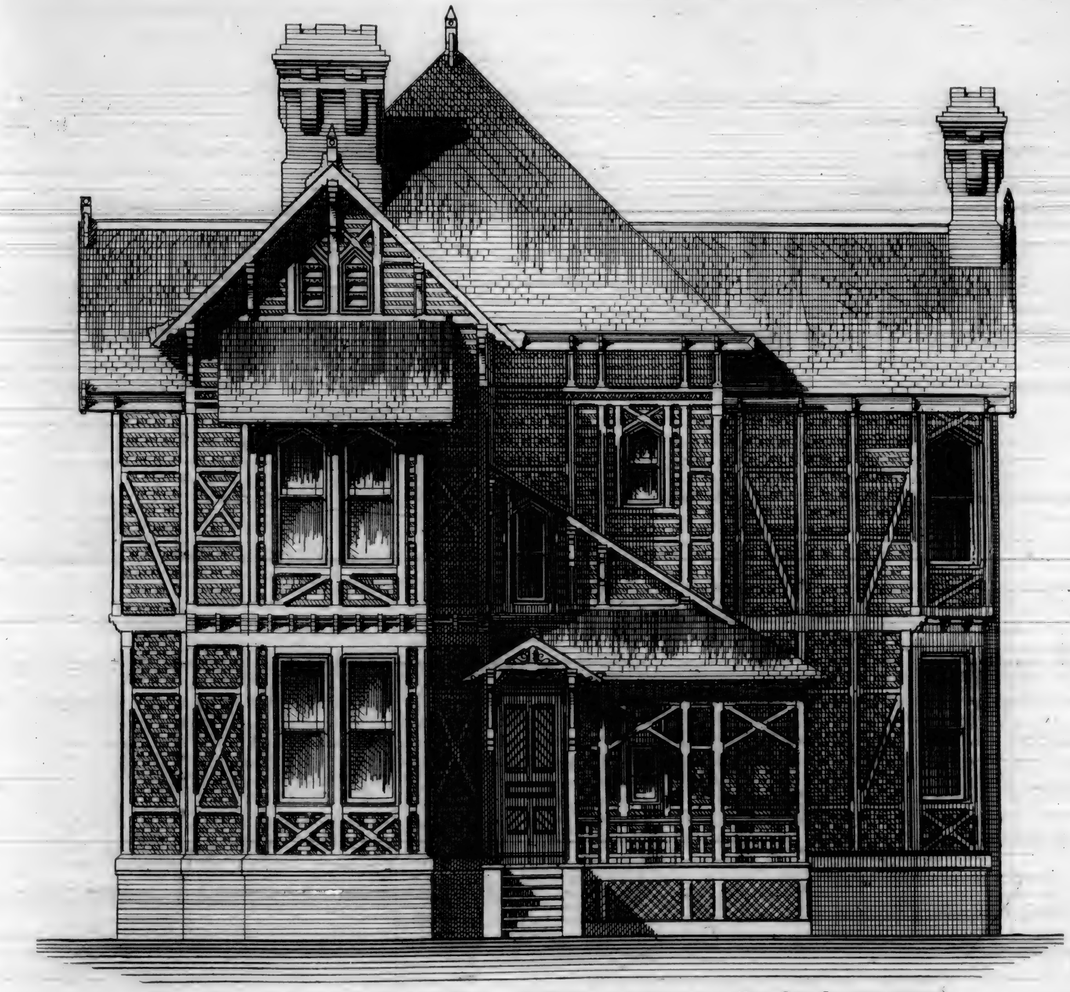
COUNTY.

	COST.
9 Frame Buildings	$12,400
5 Brick Buildings	10,100
2 Stone	8,000
Total number, 16 buildings; total cost	$30,500
Final aggregate, city and county, 44 buildings	$102,500
" " for 1884, 27 buildings	56,050
Increase over corresponding three months of 1884	$46,450

It is gratifying to note that the class of buildings about completed and those under construction, so far this year, are of a better grade than heretofore, and a larger number have employed the services of architects and draughtsmen; last year the average was about one to three and one-half, this year it is one to two and one-half. This is evidence of a higher standard of excellence being adopted by our building community. Let us give more earnest thought to the architectural planning and improvement of our buildings and homes, and surely whatever effort we make in tasteful ornamentation will be an advantage to ourselves and impart a useful example for others to emulate, and as we journey through life let us leave pleasing land-marks by the wayside.

Accept our thanks for past favors and courtesies. Respectfully yours, G. and S.

Garland Traps.



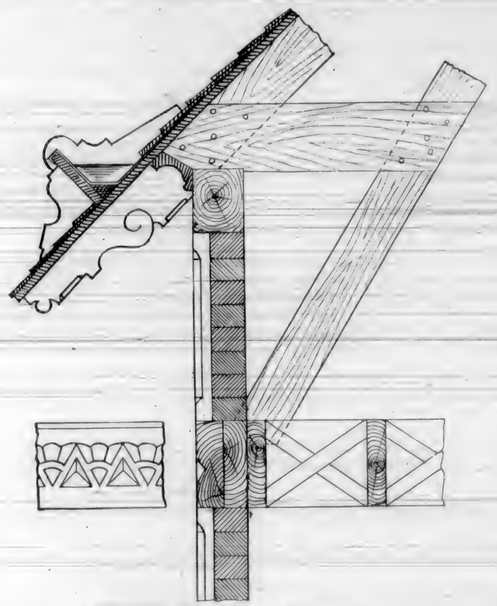
Front Elevation of a California Home.—D. Salfeld, Architect. (See Our Illustrations.)

Wasted Heat

It is a common notion among dwellers in cold climates that, in order to keep warm, we have only to make our houses air-tight, without regard to the texture of the materials of which the walls are composed. We read of the poor Esquimaux in their snow-walled huts, and shed tears enough over their pitiful condition to go far toward turning their frozen habitations into pools of salt water. But our sympathy in that direction is wasted. Walls of snow lined with white bear skins, or even with greasy blankets, are a stronger barrier against cold than plate glass windows, however they may be fortified with putty and rubber weather strips, that is, in very cold weather. Or to speak with more scientific accuracy, they will prevent the escape of heat far more effectually, which is the main point; it is not the entrance of cold against which we are to guard, but the exit of the heat. If, instead of glass, we were to use thick cakes of ice in our windows, they might not be quite so transparent, but they would be just as warm as frost-covered glass, and decidedly warmer than the glass when the wind blows and the weather is extremely cold. Woolen blankets would be vastly better than either, and common cotton cloth is almost as good, as every builder knows who has tried the experiment of keeping a house warm for plastering in cold weather before the windows are put in.

Everybody knows, too, that double windows make a house warmer, but all are not aware that this is not because they prevent the cold air from blowing in around the sashes, but because the confined stratum of air between the two thicknesses of glass prevents the heat from passing out of doors through the glass, as it would do freely if there were but one thickness, or if the two were in actual contact. It is not always remembered either, that for this purpose a curtain of any sort, even of paper, fitting closely against the window opening will have, when closed, a similar effect.

One thing more while we are upon this subject. Exchanging the warm atmosphere of our houses for the cold, out-door air, through



SECTION OF MAIN EAVES

the cracks around the windows and the invisible or unnoticed cracks and pores in the walls, is not altogether a poor exchange, for the air that we get is of far better quality than that which we lose, if of inferior temperature. But the heat that goes through the window panes is absolutely wasted, leaving the air which has parted with it to fall to the floor, keeping all its impurities still in the room.—*The Builder.*

English Law on Boundaries of Property.

MUCH has been said during the session of our late Legislature, in regard to the boundaries of property. English Law has been referred to in many instances, and in order that our readers may properly understand some of the laws referred to, we present a few that may be of interest:—

"In the absence of plans, figures, or rebutting circumstances, where a fence or hedge and a ditch are conjoined, the landowner on whose side either of the former stands, claims the latter; the theory being that excavated soil was cast on the digger's land as groundwork for his barrier, which thus with the ditch forms the boundary, and the limit being the outer bank from the fence or hedge. Property in a fence or hedge between ditches or without ditch may be joint, or rest on acts of ownership of long standing, as executing repairs, especially on demand.

"Posts and rails of paling are presumed to stand wholly on the owner's land, with pales outward and nails driven *home*.

"Joint proprietors of fences, etc., are not necessarily under obligation one toward another to preserve them, any more than a sole proprietor is similarly bound toward the adjoining owner or the public; but in both cases prudent precautions must be taken to obviate injury to others, as by scouring ditches, inclosing holes next to public roads, preventing cattle straying, etc. Generally, the tenant (who must also usually preserve boundaries), not the landlord, is liable to actions in such cases. The time a fence has existed is one element in considering liability to repair it; and twenty years is the least period.

"Where a stream flows between properties, the presumptive boundary is the central line of water, use of which is shared between opposite owners, neither being entitled to injuriously affect the other or proprietors above or below by obstructing, diverting, diminishing, or polluting it.

"In the case of houses or grounds separated by walls used by both owners and built at joint expense, half on the land of each, and also where it is unknown at whose cost or on whose land such walls were erected, they are practically common to the parties, and either may exercise acts of ownership in building, etc., so that one does not prejudice the other. If a man builds on another's ground, the latter must set up his right within a reasonable period from cognizance of the trespass.

"At common law, a man has a right of natural support of soil, so that an adjoining owner must not by excavating cause it to fall. If a house has been erected above twenty years, there is usually a special easement of support from adjoining land or houses (as from party structures), the proprietor of which is liable for injury by settlement, etc., caused by him. In other cases general right to support or to notice to take precautions should be proved. Where a row of houses is built by one owner and sold to different parties, there is by implication right to joint support."

A CARD.

A Book called "Industry of California" represents me in its pages as one of the Architects of the State Capitol at Sacramento.

Permit me to say through the "California Architect, that credit for the design of the building mentioned properly belongs to Reuben Clark (now deceased) assisted by Mr. Kenitzer.

I was, however, associated with the latter named gentleman during the construction of the dome and many other important parts of the building, until near its completion.

Neither did I in any way have anything to do with the Baldwin Hotel.

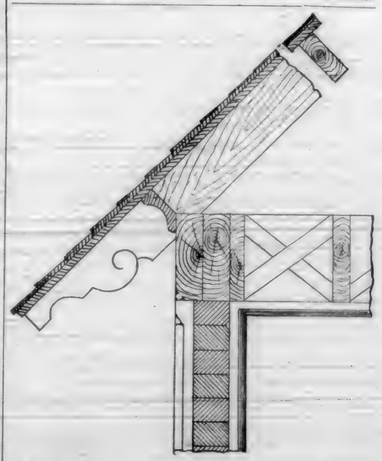
Respectfully,
A. A. Bennett, Architect,
431 California Street.

San Francisco, March 10, 1885.

(This correction was published in the "*Examiner*" of September 13, 1884.)

How Bricks Are Handled in Germany.

THERE are no hod-carriers in Germany. Bricks are passed from hand to hand. The higher up the bricklayers are, the more men are required to toss the bricks Two men to a story is about the average, with enough more to lead from the front of the building to the place where the bricks are needed. One may sometimes see three men on the ground, eight on the front of the building, and five on the top, making sixteen men through whose hands each brick passed before it reached its place of destination.



SECTION OF BAYWINDOW EAVES

Written especially for this Journal.]

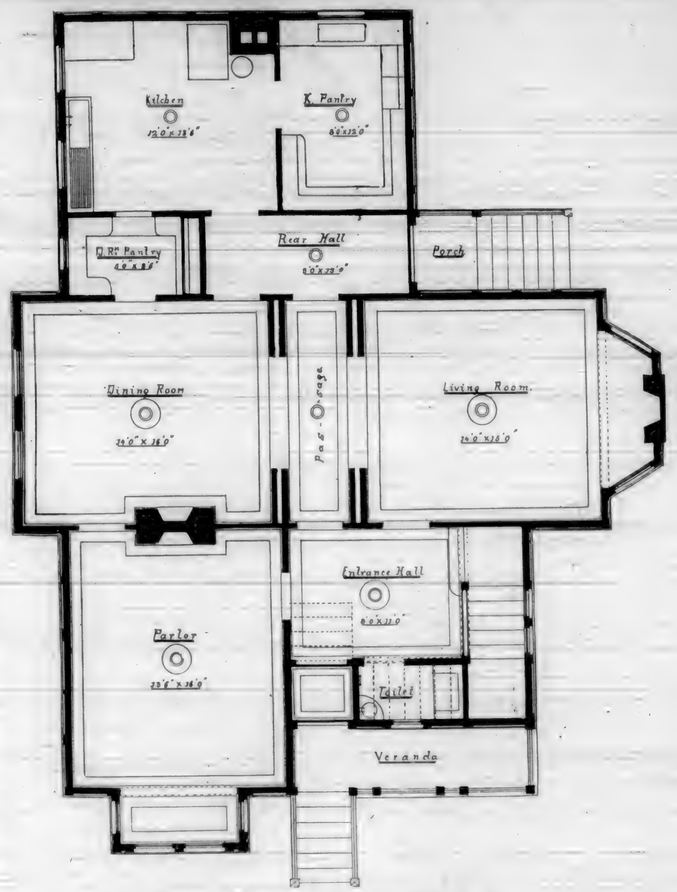
Nature's Lines of Beauty.

PEOPLE whom we have had the pleasure to meet during our occasional visits abroad, have repeatedly expressed their wonderment at the architectural lines of beauty displayed among the ruins of temples, pyramids, and the like, so often seen in Egypt and elsewhere, mentally asking why America, in her massive structures, fails to produce counterparts in this respect alone. Though we, as a nation, are experts in ornamentation and finish, still, when a large structure is completed here and admirers examine, there seems to be something lacking to give it that well proportioned look so characteristic of those preserved temples abroad.

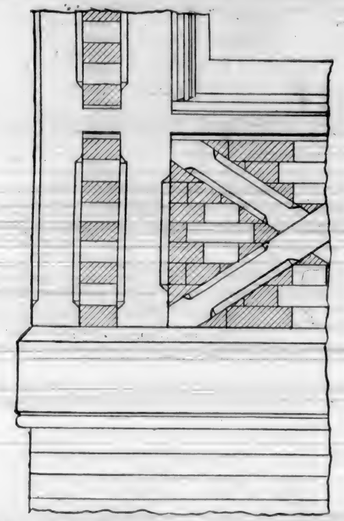
This something, though perhaps indefinable, is something nevertheless, and should we call into requisition the best architect he would be at a loss to define it; the geometrician, however, would state in an instant that in carrying out his plans, the architect had deviated from a rule that governs all things terrestrial, namely, that of the circle, this planet itself being circular in form, and nearly every one of its natural productions partake, to a greater or less degree. Any deviation from it in the arts is, technically speaking, to distort nature. The objective of the eye itself makes everything assume the rounded edge, and these sharp corners and obtuse angles are inconsistencies not to be received by this organ without recoil. All have noticed how an oval cornice, to relieve the junctures of a perpendicular and horizontal surface, mellows the sharpness and enhances the appearance of the space surrounding. A little round corner is the cosiest one of the room, and right angles make them cheerless and cold. In furniture, all æsthetic minds love the graceful curve; in painting every touch of the artist is to mellow the dark corner and round the angles. Even in the human form divine, how square features do mar our ideas of beauty and loveliness; though we educate the sense of sight to admire these lines of beauty and graceful curves, we blunt this the same by placing obtuse and triangles in the field of vision. Everything is built on the square, excepting, perhaps, the formation of character, while the organs of sight are constructed particularly with a view of comprehending circles and curves.

If we examine any of these ancient temples and palaces, we will find them all constructed in accordance with the shape prescribed by nature. The floors and ceilings, walls and copings, the exterior and interior, show the unmistakable signs of circles and curves. Should we care to prove the correctness of this, place the eye on a level with the water of an inland lake or pond, and the center will be found the highest part; do the same with the floor of one of those old-time structures abroad and the same results are apparent, viz., the middle is the highest in proportion to the size of the room, and even the most retired, narrow courts, secluded sanctuaries, and secret closets are all constructed in the same accord. Go out and view the horizon; above, a beautiful, regular dome will appear; do the same with one of their temples, and the center is a dome however small or flat, still circular in form, highest in the center; hence the massive appearance of those rooms, which, were the order of things reversed, would appear smaller in proportion to the size of the circle described. This rule is apparent everywhere in the construction of those buildings. A study of this system of architecture demonstrates many of the characteristics and perfections of a strange people who have left no clue to their origin or supposed destiny, but left these relics of grandeur that will live for all time.

Careful measurements and computation of these rooms and the arcs represented in all their architecture illustrates freely that their knowledge of the earth's shape was the same and equal to ours of this important age; and further, that their knowledge of and ability to incorporate natural appearances with architectural effects, was even superior to ours. It may be that their knowledge of optics and optical effects surpassed ours, but in any event they obeyed nature in their artistic achievements, with results that American artisans need not feel at all humbled to copy; and if they could all see the two effects in a building, they would do so without an invitation. Place a piece of canvas on the ceiling of any room; allow it to bag in the center but an inch; now note carefully how the room appears, its size and general fitness now change; and elevate the center of the canvas and again note the general character of the room, and, notwithstanding the fact that a circle has not been made, only a distorted semblance, no one who will take the trouble to perform the foregoing experiment would be willing to admit that his eye could be improved upon to this extent. Every inch of circle seems to make a foot in the height of the room, and the same rule



FIRST FLOOR PLAN OF A CALIFORNIA HOME.



Outside Elevation of Base & Windowsill.

holds true regarding the walls and corners, and the illusion increases in proportion to the perfectness and size of the circle.

Again, whether this people were aware of it or not, they made one of the best applications of the law governing stability known, for by their system of construction the building is braced from every point, no stress being imposed directly on any single point, but from the very foundation up every stone was made to sustain some portion of the weight of the entire structure, even to the ornamental work of the walls and crevices of the interior.

Placard Benisons.

We sometimes see at the doorstep of some house the word "Welcome" imbedded in the rock or on a foot-mat. It is pleasant to be so cordially and promptly invited within, but we must divide this gushing hospitality with the merest wayfarer, the peddler, and the tramp. If it were thrown down just once and for us only, what a different train of thought it would suggest! But a hospitality so broad overleaps itself and loses its subtle and most cherished fragrance, for the truth is, neither love, friendship, nor religion can be profited by tricks or by rude publicity. Their graces and benedictions, their benisons and benefits, come with silence and secrecy.

Bancroft's Histories.

This magnificent work embraces a complete history of the Pacific States. The territory covered is the western half of North America, from Panama to Alaska, including all of Central America and Mexico, and is equivalent in area to one-twelfth of the earth's surface. There are to be thirty-nine volumes, with maps and illustrations, fifteen of which are now ready. They will be well printed on good paper, neatly and substantially bound, uniform in style, and will average over 700 pages each. Three or four new volumes per annum will appear until the entire series is completed. Subscribers will not be obliged to take the work unless it corresponds with the description in every particular.

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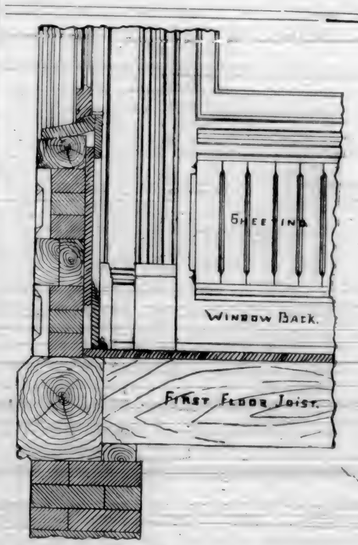
Concrete Walks.

An engineer tells how to make a cement or concrete walk requiring no great skill in preparing materials. These are water, lime, and gravel or ashes, or both. The gravel and ashes are put in a heap and wetted. One barrel of the waterlime is mixed with sharp, clean sand, dry, being shoveled over back and forth several times to get a thorough mixture. A portion is then mixed with water into a thin, soft mortar, and five parts of the wet gravel or ashes are well mixed with it, so that every fragment is coated with the combining mortar. This is important for obvious reasons. The concrete is spread on the graded walk and beaten down with a rammer until the moisture gathers on the surface; some of the dry sand or cement is then scattered over the surface to absorb the moisture, and the surface is smoothed over with a plank rubber having a sloping handle to work it back and forth. In a few days this is hard, and it becomes harder with time. By making divisions of thin strips of wood or tarred paper the cement may be laid down in blocks, squares, or diamond-shaped, and for extra good walks the blocks may be colored by mixing the finishing coat with brown or gray, or other colors, alternately.

The Safest Part of a Car.

It was well said by the conductor, who, when asked what was the safest part of a car, replied, "That part which happens to be in the shop at the time of the accident." It is a popular superstition that the center of the car is not only the safest part, but is also much the easiest riding. One of the greatest trials of a Pullman conductor's life is the fact that about every passenger asks for a lower center berth the first thing, and is frequently indignant because it cannot be had. If the center of a car rides any easier than the end, then our cars, built as solid and as strong as they are, spring up and down in the middle precisely as does a buckboard. If they do not, why should it ride any easier? As for safety, if you are in the rear of the last car on the train, and another train runs into the rear, you are liable to get hurt. In all other accidents you can conjure up as liable to occur, it is the safest. If a head collision, there is nothing back of you to add force to the blow. If the car leaves the track and collides with a bridge or any obstruction on a side track, it will not be in your end. If the train is thrown down an embankment there is nothing to land on top of you. Then, this location is the most pleasant. From it you can watch all the movements of your fellow passengers, often a good way of passing the hours of a long and tedious journey. If your eye happens to catch a particularly fine view, you can, by turning in your seat, or stepping to the door, take it all in. If there is a safest part of a train, it is in the last seat in the last car.



Section of Base & Windowsill.

Pacific Coast Nail Trade.

Somebody has asked, "What has become of all the pins?" With equal propriety it might be asked what becomes of all the nails. A nail is often a handy thing to have round the house, but it is not so handy to find one if there be any boys about the house. A good housewife says a boy's pocket is the best place to look for nails. It is not certain whether nails attract boys or boys attract nails. The two objects are sure to come together and remain fast friends until a hammer can be found, and then there is an eternal separation, but the nail is found to be just as fast a friend as ever. Less than a century ago, all nails were hand made. Now there are 80 nail factories in the United States running over 6,000 machines, with a capacity, if all were steadily employed, of over 12,000,000 kegs per annum. The largest amount produced that we can recall was 6,147,000 kegs of 100 lbs. each in 1882

Nails are made in some 17 States of the Union. Among the latest States to enter upon this industry are Wisconsin and California. The latter entered upon nail making in January, 1883, with 50 machines.

Up to within the past two years, all the nails used on this coast were imported from the East. The imports at San Francisco, in round numbers, for the past twenty-two years, have been as follows:—

1863, kegs	95,000	1874, kegs	215,700
1864	94,400	1875	232,100
1865	70,300	1876	181,900
1866	103,100	1877	218,000
1867	190,800	1878	223,000
1868	158,200	1879	162,000
1869	176,600	1880	192,500
1870	103,900	1881	259,300
1871	150,200	1882	200,700
1872	225,000	1883	178,200
1873	129,000	1884	101,700
Total, 22 years			3,651,300

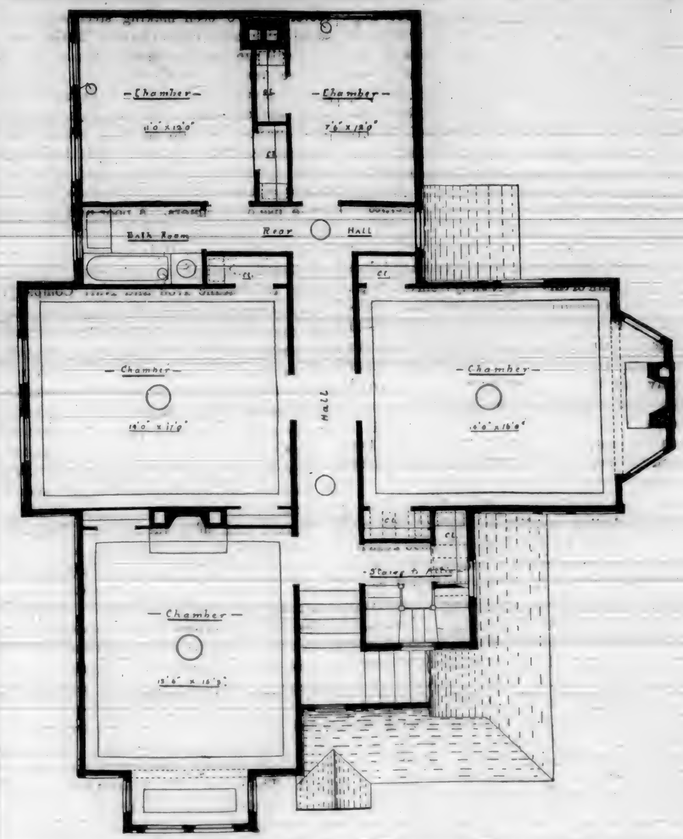
Dividing this period into two equal parts, we find the imports for each to have been as follows:—

1863 to 1873, kegs	1,490,500
1874 to 1884	2,161,800
Totals	3,651,300

The imports for the last eleven years show an increase of 45 per cent. over the first eleven years. The real increase has been larger, because some of the principal cities in the interior, which formerly drew all their supplies of this character from San Francisco, have been importing considerable quantities direct from the East in the last few years. These consignments are dropped off the cars at Sacramento, Marysville, Stockton, San Jose and Los Angeles, and of course no longer figure in the imports at San Francisco. While there was only 101,700 kegs Eastern nails landed at San Francisco in 1884, the total supplies which reached California from the East in that year are estimated at 134,000 kegs, showing that over 30,000 kegs were dropped off at terminal points in the interior.

Prices, brands and means of transportation have undergone great changes during the above period. In the early days of San Francisco nails were very valuable, and many sharp corners were made to the profit of the holding interest. The year 1865 was also a speculative one in this branch of trade. In January, 1865, prices were from $4.50 to $4.75. In February, the outside rate was put up to $5.50, but immediately afterwards, under fresh arrivals, rates went down to $4.37½ to $4.50. These were the lowest figures that year. In April, $5.50 was paid and in May, $5.75. From June to October, the market rated at $6.00 to $6.50. In November the price was advanced to $6.75 and in December to $7.00. In January, 1866, the New York currency price was $8.00, and the freight by sail out was $1.50 in currency. This made the price equal here to $7.00 per keg in gold. Some lots were sold at about that time at $7.25 from ship, while jobbers were generally asking $9.00@$10. These are the highest figures we can recall in the past quarter of a century. From $4.50 in 1869, prices rose to $5.50 in 1870 and $6.00 in 1871. Since the last named year rates have never been as high as $6.00, with the exception of 1880, though they have frequently reached $5.00 and upwards. In 1878 they fell as low as $2.75, which, up to that time, was said to be the lowest figure reached. That was a very unsatisfactory year to importers, who failed to realize cost and freight on some of the lots sold. In 1879, there were sales as low as $2.00 but the price advanced to $5.00 before the end of the year. Prices were also low in 1883, the average being $2.40 to $3.40. They sold as low as $2.75 in 1884.

The favorite Eastern brands have been Boonton, Oxford, Old Colony and Fall River. In 1876 other brands came upon the market. Notably among these were some consignments from the Riverside Iron Works at Wheeling, West Virginia. This factory sent us 20,000 kegs that year, which sold at $3.20 to $3.50. Some of these were said to be peculiarly adapted to Pacific Coast woods. In 1881 some more new brands were received from Pennsylvania and Ohio factories. Reduced overland freights were the inducement at that time. Prior to 1870, all our nails came by sailing ships. Nearly every ship leaving New York or Boston for this port would have consignments of this character, seldom less than 1,000



Second Floor Plan of a California Home.

kegs, and sometimes as much as 7,000 kegs. Soon afterwards, the reduction in freight by the Panama steamers, brought about by the opening of through rail connection with New York, made it possible to ship these goods by way of Panama. Since 1874, the railroad has also been availed of to bring consignments. The imports for that year reached San Francisco by the following means of transportation:

Per ship, kegs	153,900
Per steamer	57,700
Per railroad	4,100
Total	215,700

The steamers and the cars have since taken the great bulk of this freight away from the ships. It is a common occurrence of late years for the Panama steamers to bring us 3,000 kegs on a single trip. But there are only two steamers per month. Freight trains arrive daily from the East, both by the Northern and Southern routes, and scarcely a train comes into the borders of California without some consignments of this kind. At least this has been the case up to the opening of the year 1885.

The estimated consumption of San Francisco, including supplies sent inland, has varied from 85,000 kegs in 1865 to 259,000 kegs in 1883. These figures show a monthly consumption varying from 7,500 kegs to 21,600 kegs. Our dealers have been accustomed to carrying a stock of 6,000 to 60,000 kegs. Now that supplies are obtainable at our doors, the hardware men allow the manufacturers to carry the burden of stock. It will probably be a long time before we cut entirely loose from Eastern supplies of this nature, though we are informed that the local factory has sufficient capacity to meet all the demands of the coast. This factory is located at Oakland, and was erected in the closing months of 1882. It is supplied with the latest improved machinery. The building is two stories high, and the machines are placed in the second story, the nails dropping through apertures in the floor to reservoirs on the first floor.

A rolling-mill is attached to the works, so that the iron is prepared and all the operations completed at the same point. The factory has a fine water frontage, and the first cargo of 500 tons iron came alongside the company's wharf in January, 1883. There is also rail connection direct from the factory with all parts of the country. The factory has encountered the usual obstacles incident to the introduction of manufacturing enterprises in this State. There have been two or three strikes among the workmen concerning wages. But everything is now running smoothly. The factory made about 100,000 kegs in 1883, and 129,332 kegs in 1884. At the close of 1884, the factory held a stock of 21,561 kegs. The managers expect to make 200,000 kegs in 1885, and claim that the factory has a capacity for 300,000 kegs. Despite this outlook from the local factory standpoint, it is probable that at least 100,000 kegs will be received here from the East this year.

Within the past two years some of the factories have been making steel nails and tacks with more or less success, but whether steel will run out iron in this line of manufactures remains to be seen. It is to be regretted that some of the iron nails sold in this market in the past year have been of very poor quality. We do not know where they were made, but have seen them bend and break rather than enter the wood in which they were being driven by those accustomed to the use of hammers. A poor nail is about the most provoking thing in existence, and there is no excuse for their manufacture. We have heard no complaint concerning the product of the Pacific Iron and Nail Company, and it is fair to presume that the poor nails have come from abroad. We understand that the local factory at Oakland has recently added a line of French wire nail machines, and is now prepared to turn out all kinds and sizes of this description. The demand for wire nails has become quite prominent in the last three years, and we are glad that they are now made here. They are largely used by sash, door, furniture and organ manufacturers, picture frame makers, car builders, and house and office furnishers. They are quite stiff, and can be driven into hard wood without the use of a brad awl. They number more to the pound, and are therefore considered cheaper than other sorts.

The Pacific Iron and Nail Company undertakes to make every nail known to commerce. The list is altogether too long to print in this connection, and prices vary with the size and description. The enterprising gentlemen who started this industry on our shores deserve well of their fellow citizens, and it is a pleasure to know that their efforts have been appreciated. The wonder now is that a nail factory was not started here ten years earlier. It meets a long-felt want of this city and coast.

Cherish a Slow Man.

If you have got a "slow man" in your shop, then cherish him. He is a treasure. We don't include lazy men or time killers; bounce them at once.

A genuine "slow man" will do more work than two "lightning dodgers." To one unacquainted with him the slow man seems to be principally engaged in getting ready to do his work, but just about the time you think he has "got ready," the job is done.

He never does a job wrong, or makes a false move. He *thinks*. He plans a blow before he strikes. You never knew him to make a bull of a job and then have to work eight hours to get rid of the mistake. When he makes a mark, he knows it is in the right place, and he takes his time to work to his marks, and has confidence that his work will come together.

Watch the slow man and the lightning chap. They are both at work making patterns for a clamp box. The slow man selects a piece of nice timber, takes it out of wind and squares it up. He is sure he has got plenty of stock. He picks each part from the drawing, cuts a paper pattern of each and blocks out each piece. He will finish up two or three and have the glue drying while he is making core prints and rounding corners.

The lightning chap has found a chunk of wood under the bench which he *thinks* will be "big enough." He measures the patterns, makes a few marks on his blocks, and begins to cut it out. How he makes the chips fly! He cuts and chisels, and then stops to measure. One end of the block is worked down to shape of the box and then he finds it is coming out ⅜ inch short, and a piece must be glued on. While he is waiting for the glue to "set," the slow man gets all ready to glue on the last core print. It takes quite a number too, as the bolt holes are all cored out; it makes a better job than if the holes had been drawn in green sand.

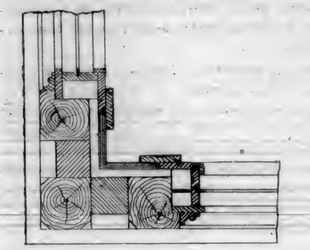
The slow man rounded each piece before he glued them together. He don't have to work into bad corners with his sandpaper, and he is all ready for the first coat of black before the fast man has got his work all blocked out.

Everything is done when the slow man lets go of it. He don't have to look all over his work nine times to see if the splits and jambs are all worked out. When the first coat of black is dry he runs in one or two wax corners and fills up a worm hole, puts on two more coats of black, sandpapers a little, and the job is well done.

As he takes the pattern down to the foundry, he carries the shellac to the "lightning" man, who is just gluing on a corner which he knocked off as he was cutting it down in a "hurry."—*J. F. Hobart, in Wood-Worker.*

A Clergyman on Shavings.

Rev. Dr. Paxton, in a lecture before the Mechanics' and Tradesmen's Union, a few evenings ago, stated in a few words a good many truisms. Shavings, the lecturer said, were not of American invention, like whittling, but were as ancient as the working of metals by Tubal Cain. They are the necessary waste of every work. There is a certain loss from every gain; there is no building without its rubbish heap to remove, which requires almost as many carts as to bring the building material. The fewest substances in nature are found pure. Construction is based upon destruction. Every joy presupposes a sorrow. The door posts of progress are sprinkled with the blood of its martyrs, and along the way are scattered like millstones the bodies of those who have fallen in the path. We cannot get something for nothing; for every tit there is a tat. The wrecks of rich men's sons to be seen everywhere show that it is as hard to keep as it is to get. Without toil there is no substance; hence the recklessness with which estates are squandered, without any regard for the toils and hardships that had to be undergone to procure them. It may be likened to the sacrifice of human life at the battle of Bunker Hill, through which the salvation of our country was procured.—*Scientific American.*



Plan of Corner of Baywindow

Oil Stones.

Keep your oil-stones clean. Many users of oil-stones keep them full of oil all the time, all covered with dirt and gudgeon-grease, and when they want to use them, must scrape a place with a chip before they can make the tool "take hold." Wipe the stone clean after using. Do it every time, too, not once in a while. Get in the habit of it, and it will come natural.

Don't let a stone get gummed up. If you have been guilty of keeping such a one, just take a new deal and "try out" your stone. Put it in a kettle with water and potash—some soapine will do first-rate (and soapine should be kept on the sink of every shop in the land)—and set it over a fire, or stick a steam pipe into it. Boil for an hour or two, then soak and wash well in clean water. You will then be able to see what your oil-stone looks like, and it will "take hold" like a new broom.

Some men place their oil-stones in the sun and let the oil try out. But the potash is the best; it "kills" the grease on the spot.

An oil-stone needs "truing up" very often. I remember, when a boy, of truing a stone. Our worthy father set us at the job of rubbing the stone on a board covered with sand. How slow it did cut! It generally took two or three hours to do the job. Every three or four "rubs" I would have to examine to see if it was "most done;" and then before I got to work again, Tim Blodget would come along and try to argue me into "goin' fishing," and then how I hated that oil-stone.

Don't let a stone get too "hollowing." Use long strokes in rubbing a tool upon it. If it gets a little worn in the center, take it to the grindstone or a big emery wheel. Hold it against the *side* of the wheel; not on the face. It will take but a very few minutes to grind the oil-stone true and smooth.

I never yet saw a loafer hang around a shop half an hour without getting out his jack-knife and "going for it" upon the middle of an oil-stone. If I have a knife to sharpen, I do it near the *end* of the stone. The ends don't wear down; it is the middle that gets most of the work. Some journey-men put a wire across the middle of their oil-stones. They have to work each side of it, but the loafers have to, too.

If you break a stone, don't throw it away. If thick, or nearly new, boil the grease out of it, and *glue* it together with common glue. It will hold if you get all the grease boiled out before you put on the glue. If the stone has become worn pretty thin, you had better grind it down into slips. It will make some nice ones of the very best quality.

Don't put the stone into a block of wood. It makes a nasty thing to keep clean; go to the hardware store and buy a nice oil-stone holder. You can put it on in two minutes, and take it off in "no time," and wipe the stone clean as often as you wish.

A hard, glossy oil-stone is not worth buying. A stone which looks like a piece of marble is good for nothing. A stone with a sand-stone complexion is too soft, and will work bad. The "muddy" stone is another to be avoided. Somewhere I have seen a receipt as follows: "Draw your thumb nail along the stone; the faster it cuts away the nail the better the stone." It looks reasonable, but I have never tried it.

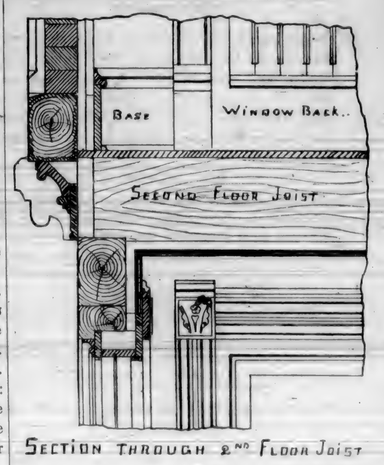
Petrified wood makes the best oil-stone. I have a Scotch stone which cuts very fast, yet will set an edge to "cut a hair." Some years ago a firm started to manufacture "silex" stones for oil and water, both hand and power. The "silex" stone was ground fine, mixed with some secret "uniting compound," and moulded under hydraulic pressure. The stones thus produced were pretty good, but were apt to "glaze," and then neither oil nor water seemed to have any effect in removing it. Whether or not they are made now, I do not know.

There is a knack in using oil-stones well. Don't rock your hand and make six or eight bevels on the work, or else make a curve in place of a flat "bevel." Keep your wits upon the top of the tool, and see that it travels as fast as the bottom edge does. The tendency, when pushing from you, is to lower the top of the tool, but a little attention to this point will enable a man to do a job right, and get a better edge in the very shortest time.—*American Machinist.*

Measuring the Height of a Tree.

There is a very simple way of measuring the height of a tree, which can be practiced by any one on a sunny day or in bright moonlight. All the apparatus that is necessary is a straight stick, of any length. Draw a circle with a radius (half the diameter) of a little less than the length of the stick. This will be done by holding one end of the stick, say two inches from its end, and moving the other end around, making the circle with a knife or a chip. Then place the stick in the ground exactly in the center of the circle, perfectly upright, and press it down until the height of the stick is exactly the same as the radius of the circle.

When the end of the shadow of the stick exactly touches the circle, then also the shadow of the tree will be exactly in length



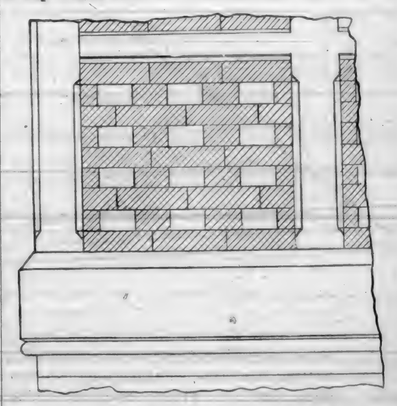
Section through 2nd Floor Joist

the same measurement as its height. Of course, in such a case, the sun will be at an exact angle of forty-five degrees.

Measurements of this character can be best effected in the summer, when the sun is powerful, and has reached to a good height in the heavens, and when the trees are clothed with living green, so as to cast a dense shadow.

To many to whom this idea may not have occurred, it might be made annually a matter of interest thus on warm summer days to take the height of prominent trees, and so to compare growth from year to year.—*Hall's Journal of Health.*

A chicken with a clipped wing made several ineffectual attempts to fly over a fence. An Irishman, who witnessed the efforts of the "chick," laughingly exclaimed: "Begorra, she has a defective flew."



Elevation of Brickwork First Floor

Brick-making.

WE hear a great deal said of late about perfect brick. We mean by this brick with sharp and well defined edges and corners. Not only this, but they must be straight, so that when two are placed together in a wall the edges come close together the entire length of the brick.

In common building, brick defects are not so often noticed, but in front or ornamental brick it is absolutely necessary, in order to make a good job, that the brick be straight, the same thickness at each end, and of uniform size. The reasons are many why brick so often come short of these requirements.

First, as to machine-made brick. Almost all machines that deliver the clay in a continuous stream, with wires or other means of cutting the clay into proper lengths, make crooked brick.

One reason is that the wire in cutting the clay drags the end of the brick, or if cutting the length way of the brick pulls the sides down.

Another reason is, the clay is not of a uniform density in the brick, the machine often delivering more clay to one or other of the sides or edges, thus causing the brick, if not crooked when made, to dry crooked.

The mud machines that make each brick in a separate mould-box often feed one side or end of the mould heavier than the other, and again the brick are often dumped in emptying them out of the moulds and hence dry crooked, and I assure you they get no straighter in burning.

The same difficulties are often encountered in hand-made brick.

The clay is often pressed unevenly into the mould, and in striking it is drawn to one end, and in off-bearing the brick are dumped.

These difficulties need only to be mentioned to suggest a remedy.

First. The machine builder must build his machines so that they will make brick of uniform density throughout. This applies to dry press machines equally as well as to the mud machines.

Second. The brick must be properly delivered from the machine and properly placed on the floor for drying.

But brick machines and hand-moulding are not to be charged with all the crooked brick made.

A brick may be ever so well made, and unless dried properly, it will be crooked and ill-shaped.

The manner of drying brick of course depends largely upon the clay, but there are a few thoughts that equally apply to all clays.

Those who use drying floors have noticed, no doubt, that the brick draw up at the ends. This often comes from too fast drying, and often from the floor being too dry when the brick are placed upon it. We find that by wetting our floors before placing the brick on them they dry without warping. Where the brick are dried in the sun, if the clay is at all dense, they are apt to warp, especially if the ground is moist. As a general rule, the ground should have one day's sun between each day's drying.

In making press brick the drying is very important.

The mud must be of a uniform moisture when the brick are moulded, and the brick must be uniformly dry when pressed. If not they will be of different sizes.

In order that they be straight, each brick must be uniformly dry when pressed and set in the kiln.

If one end be dryer than the other, or if the corners be dry, the brick will not come from the press straight. There being more rebound in the moist portion than in the dry, when the brick is taken from the press, the moist portions swell, leaving the brick of uneven size.

This can be overcome by hacking the brick before pressed into large piles and covering them with wet cloths. In this way the moisture becomes equally distributed through the entire hack, and they become moist.

After they are pressed they should be placed on a moist floor, yet warm enough to dry in hacks of from five to eight high.

The bottom brick should always be perfectly level. They should remain in these hacks until dry enough to handle without damaging them, then taken down and rubbed with the hand and hacked on edge eight or ten high. We are aware that press brick makers have many ways of handling brick, but we have found the above to be the best and surest way to have them dry straight.

If they are straight and thoroughly dry when they are set, they will come out of the kiln in good shape.—*W. A. Eudaly, in Clay Worker.*

An Amateur Carpenter.

BILL NYE, in the Denver *Opinion*, relates his experience as an amateur carpenter, as follows:—

In my opinion every professional man should keep a chest of carpenter's tools in his barn or shop, and busy himself at odd hours with them in constructing the varied articles that are always needed about the house. There is a great deal of pleasure in feeling your own independence of other trades, and most especially of the carpenter. Every now and then your wife will want a bracket put up in some corner or other, and with your new, bright saw, and glittering hammer you can put one up upon which she can hang a cast-iron horse-blanket or lambrequin, with inflexible water-lilies sewed in it.

I made a very handsome bracket last week, and I was naturally proud of it. In fastening it together, if I hadn't inadvertently nailed it to the barn floor, I guess I could have used it very well, but in tearing it loose from the barn, so that the two could be used separately, I ruined a bracket that was intended to serve as the base, as it were, of a lambrequin which cost $9.00, aside from the time expended on it.

During the month of March I built an ice-chest for this summer. It was not handsome, but it was roomy, and would be very nice for the season of 1884, I thought. It worked pretty well through March and April, but as the weather begins to warm up that ice-chest is about the warmest place around the house. There is actually a glow of heat around that ice-chest that I don't notice elsewhere. I've shown it to several personal friends. They seem to think it is not built tightly enough for an ice-chest. My brother looked at it yesterday, and said that his idea of an ice-chest was that it ought to be tight enough at least to hold the larger chunks of ice, so that they would not escape through the pores of the ice-box. He said he never built one, but that it stood to reason that a refrigerator like that ought to be constructed so that it would keep the cows out. You don't want a refrigerator that the cattle can get through the cracks of and eat up your strawberries on ice, he says.

A neighbor of mine who once built a hen resort of laths, and now wears a thick thumb-nail that looks like a Brazil nut as a memento of that pullet corral, says my ice-chest is all right enough, only that it is not suited to this climate. He thinks that along Behring's Strait, during the holidays, my ice-chest would work like a charm. And even here, he thought, if I could keep the fever out of my chest, there would be less pain.

I have made several other little articles of *vertu* this spring, to the construction of which I have contributed a good deal of time and two finger nails. I have also sawed into my leg several times. The leg, of course, will get well, but the pantaloons will not. Parties wishing to meet me in my studio during the morning hour will turn into the alley between Eighth and Ninth Streets, enter the third stable door on the left, pass around my Gothic horse, and give the countersign and three kicks on the door in an ordinary tone of voice.

An auger which bores a square hole is now in common use in Cleveland, where a joint stock company is being organized for the purpose of manufacturing them for the market. The *Herald* of that city thus describes it: "Its end, instead of having a screw or bit, has a cam motion which oscillates a cutter mounted on a steel rocking knife which cuts on both sides. In order to prevent the splitting of the wood the ends of the cutter are provided with small semi-circular-shaped saws which help in cutting out perfectly square corners. It is estimated that this new process will save the labor of three men who work with chisels, as one man can conveniently cut a two-inch mortise in the same length of time that he can bore a round hole."

A Plain Talk with the Boys.

"ANYTHING that is worth doing at all is worth doing well." Never allow this to escape your memory. Be punctual at your work in the morning; try to be on hand fifteen minutes before the regular time; assist in cleaning up the shop; get out what material is wanted by the journeyman you are helping, and have it in readiness to start with him promptly on his arrival. While in the shop, keep everything looking clean and tidy; have a place for everything, and keep each thing in its place. If you want a tool of any kind, do not have to rummage through half a dozen drawers to find it. Keep the man's tools you are with in a building close together; watch his motions closely and you will be able to know nearly every time what tool he wants next, without his asking for it; do not wait to be told to put on your solder-pot after the man is ready for it; have it ready for him when he is ready; he will appreciate that you are trying to assist him, and paying strict attention to your work more than if you should wait for him to tell you everything.

Never leave a fire you have been using anywhere about an unoccupied building when you quit work at night; see everything safe before you leave. Don't annoy the cook in the kitchen by insisting on heating your metal on the stove or range; she has her cooking and baking to attend to, and the progress of her work is just as important to her as yours is to you. Take your pot outside and build a fire in the street, if you can do no better; by doing so you will often save a great deal of trouble and annoyance. In going to and from your work, and always when on the street, "brace up;" don't go along in the everlasting hang-dog, slouchy kind of way, as if you were afraid of getting somewhere two minutes before time. It looks more like business if you "pull out" like a man,—as though you had to make a train and were afraid of being late. I have seen boys on the street with tools on their shoulder, a pipe or stump of a cigar in the mouth, ambling along as though they were very tired, or afraid of getting to the shop five minutes before quitting time, for fear they might be started on another job. I am sure that if their employers could have seen them they would have much rather the boys would spend their time, if they had any to spend, in the shop. It is just such movements and actions as I have described that attract the attention of employers and customers and make them dislike you. Do your work quickly, neatly, and quietly; move briskly to and from your work, and you will gain friends in the shop and out, and gain the confidence of your employer, who is not slow in noticing any little defects or faults, if you have any, and whose interest it is to advance you as rapidly as possible, if he sees by your actions and work that you are trying to advance yourself. This may seem all very funny to you, but it is plain talk, and I think most of you know what I have stated to be facts, and facts are said to be very stubborn things, and it is best we should know how stubborn they are.

You must not think that all these little things are not noticed by the people you have to deal with every day. They are; and the success or failure of your future life depends very largely upon your present conduct and actions. Ever remember that politeness and a pleasant answer cost nothing at any time—have them always ready—and that neatness in dress and personal appearance, quick, lively movements and a watchful eye to business are the qualities that win.—*The Sanitary News.*

Mortar.

IT is commonly supposed that anybody is competent to make mortar, while, judging from the results attained, nobody seems to know much about it. Good mortar is a solid silicate of lime—that is, the lime unites with the silica or sand, thus forming a silicate of lime. In ancient days those who had some conception of the way these two materials united, superintended their mixing, and the result was mortar, specimens of which have come down to us, and which are far superior to those that we are commonly using. Dry lime and dry sand laid together, or mixed and kept dry for 1,000 years, would not unite to form a silicate of lime any more than acetic acid and carbonate of soda dry in a bottle would effervesce. To make silicate of lime just as good as was made by the Romans, all that is necessary is to proceed intelligently: procure good caustic—*i. e.*, fresh-burned lime—and if you find it all powder, *i. e.*, air-slaked, don't use it; use only clear lumps. Slake this, using only enough water to cause the lime to form a powder. To this, while hot, add clean sand, not dirt and loam called sand, but sand; and with the sand add enough water to from a paste. Then let it lie where it will not become dry by evaporation—in a cellar, so much the better, for as soon as you have mixed the sand and lime as above, they begin to react one on the other, and if not stopped by being deprived of moisture will go on reacting until silicate of lime (as hard as any silicate of lime ever was) is formed. But if you take this so-called mortar as soon as made and lay bricks with it, unless the bricks are thoroughly wet you stop the formation of silicate of lime, and might as well lay your bricks in mud. Lime and sand, after being mixed, might lie two years with advantage, and for certain uses, such as boiler setting, or where the whole structure of brick and mortar is to be dried, the mortar ought to be mixed for one year before use, and two would be better; but for house building, if the bricks are so wetted as not to rob the mortar of its moisture as soon as used, mortar that has been mixed a month will form good, solid silicate of lime among the bricks it is laid with in ten years, and will be still harder in one hundred years. The practice of mixing mortar in the streets and using it at once is as foolish as it is ignorant, and would be no improvement.—*The Mechanic.*

Painted Floors.

THAT carpeted floors are harborers of disease is a question which, to those who have been placed in position to fully investigate, has but one side; and since some of our leading journals have called to mind long arrays of unquestionable authorities proving that carpets, however clean and free of dust apparently, give off at every step or movement infinitesimal germs of lung irrants, the people seem to have indorsed the theory, and in many a fine house carpets have given place to Eastern rugs, which, occupying a central position, leave a fine opportunity for the painter to display his taste in decorating the intervening space between the rug and wainscoting. It will, however, place the work and imperfections of the carpenter more prominently before the people, inasmuch as the floor, being constantly exposed, must be made smoother and of better lumber than often finds its way into the floors of our houses, for when the floors were entirely covered with carpets, damp, unseasoned lumber or timber, or the same affected with dry rot, could be used, and the occupants be little the wiser for the deception; but now the floors must be of good lumber and nicely fitted, else the painter, whose work supersedes that of the carpet-layer, will not accept the floor as the carpenter left it, for his work, being on top, he will be held responsible for its appearance forever afterward.

If this change in fashion brings about this revolution in floor-making, the change will have another argument in its favor; for others, as well as we, have seen damp, unseasoned lumber put in floors, which in turn were laid upon the joists of the same or even worse quality, and then a carpet covered over all. The poor inmates were thus compelled to breathe the moisture of seasoning lumber after it was filtered through a carpet, which tended to render it still more unhealthy, and hence we are of the opinion that carpets are responsible for much less disease than charged with; nevertheless, we are decidedly in favor of the rug system of covering floors, for the reason that it is much more economical, it is hygienically and otherwise a very wise plan, besides the facility of often removing and thoroughly shaking the rugs, without employing a lot of workmen to take up, and beat and put down again. It looks as though carpets, like the Chinese of the Pacific slope, "must go."—*The Manufacturer and Builder.*

AN exchange says: House building is a trade of itself, and a very complicated one, too, requiring not only a large experience and good credit, but also the possession of a discriminating judgment to pass upon the relations existing between demand and supply, the condition of the labor and material market, and the falsely excited or unduly depressed style of reality in particular localities.

Shingle Roofs.

THE form of roof known as a shingle roof is one of the greatest antiquity. When it originated or by whom invented history fails to tell us. It is probably one of those things of natural growth which never had a definite beginning, but came up by gradual steps of improvement from a very primitive form to its present shape. Reasoning by analogy, it may have originated in an attempt to imitate the feathers of birds, which shed water in a most remarkable manner. Its prototype is also found in the arrangement of leaves on certain trees. It may have been preceded by the thatch and some forms of bark roofs, and those have come into use as an improvement on a still more primitive type. Shingle roofs may be described as pioneers in roof construction. When timber is abundant a shingle roof is one of the cheapest that can be constructed. Its lack of durability in a comparative sense, and its frequent destruction by fire, make it less desirable than other materials; accordingly, as lumber becomes scarce, as house owners become wealthier, and as buildings improve in character, shingle roofs give way before material better adapted to stand the test of time employed in the newer sections of the country than in the older, and the use of shingles upon roofs is to a certain extent an indication of the class of buildings that are being erected. As pine timber becomes scarcer, and as prices for shingles gradually advance, their use in this country is likely to be more and more restricted until it is possible that in this country, as in England, the time may come when their employment will be the exception.—*Carpentry and Building.*

Boxwood and the Demand.

IT seems that the rapidly increasing use of roller skates has a marked effect on the price of boxwood, especially on the kinds most in favor for rollers. A dealer in hardwood recently gave a reporter of the *Sun* some interesting points in reference to the trade. If the facts accord with his statements, there are likely scores of enterprising dealers out of all patience with themselves for their failure to institute a corner in the stuff when the opportunity was at hand. "The roller skating mania has completely exhausted the market of a certain size of boxwood. Less than eighteen months ago I could sell a ton of three-inch boxwood for $38.00, and it would be a first-grade in every respect, and admirably suited for turning small work. The demand then was steady, and the principal consumers of the wood were rule makers, tool manufacturers, and turners who supplied the market with boys' tops, pool-pins, and toys of various sorts.

"The sudden and remarkable growth of the roller skating pastime has created a constantly increasing demand for a certain size of wood, and now it is impossible to purchase a ton of suitable wood for skate wheels for $120. Rollers are made in several sizes, ranging from 1⅝ to 2⅛ inches in diameter, and only the natural growth of boxwood approximating these sizes is fit for use. Large wood is too costly, and is less firm in resisting the tremendous strain of a skater's weight upon an axle only 7-32 of an inch in diameter. The boxwood grows in Persia and Turkey, and heretofore the crop has been handled in England. It is a wood of very slow growth, and in its native country stringent timber laws restrict the depletion of the growing trees. At the present rate of consumption, the world will be practically exhausted of its boxwood in less than twelve months unless some equally cheap and durable substitute is found to take its place."

Referring to substitutes, he said that rubber, celluloid, rawhide, vulcanized fibres, and compressed paper have been tried for making rollers, but for one reason or another have proved unsatisfactory; some have proved too soft, while others, like the pure celluloid wheels, have been found too expensive for the trade, and the necessary metal bushings have proved objectionable, because the grit and dust from the floor and the shoes of the skaters, wearing between two metal surfaces, have rapidly cut away the axles of the skate. Rollers with anti-friction bushings, consisting of a number of small steel plugs freely revolving around the axles, have been tried with some composition wheels with success, but they are very expensive, and on this account cannot come into general use. Other woods have been used, such as dogwood, apple, pepperidge, laurel, and lignumvitæ, but have for the most part been rejected. The lignumvitæ alone is hard enough, but it will not stand the strain of the small axle. Metal wheels having a surface of rubber are made, but nothing has yet been found which in all respects is as good as boxwood.—*The Mechanical News.*

Don't Botch a Job.

DON'T botch a job just for the sake of getting it done quick. You cannot do an hour-and-a-half job in sixty minutes and do it right. Some bosses think it is possible and are always trying it. Just take things easy and make your brains save your hands. Take time to get ready before you begin and you will get done before you know it. We do not mean for you to stand around talking about a job. Some men will talk about it longer than it takes to do the whole job. If you are intending to glue up a lot of pieces of board, it pays to look up your hand screws before the glue is put on. A man who gets the screws ready by opening them just the right distance and trying them to see if they work all right, will get done a good deal quicker than the one who gets his glue on, rubs the joint together and finds he lacks two screws. While he is running around to each machine in the shop, looking for hand-screws, the glue gets cold and the joint will not come up. He must wash the joint in hot water, wipe it all clean and then begin over again. If this man had begun right, he could have glued up two joints while he was doing this one. It is a common trick of hand-screws to get lost. They stray away and get covered up under lumber, shavings and fire-wood. Nobody ever took a hand-screw from its place, but it will be found just where you never think of looking for it. You may be sure of finding one or two at every machine in the shop, but you can't find the man who put them there. It is about like the story of the bull which jumped aboard a boat and chewed off the hay rope. The question was, "Did the bull steal the boat, or the boat carry off the bull?" The hand-screws have been carried off or they have run and hid.

If you have got a lot of good hand-screws, take good care of them. Do not leave them screwed up tight any longer than you can help. If you put them on a job during a dry day and a rain comes on, it is all you can do to start those screws, and they are strained unnecessarily. Oil your screws with a good fixed oil and then rub them full of plumbago or black lead. Just try it once; it makes them work nice and the weather does not affect them as much.

One of the most aggravating things that can happen is to have the doors opened while you are gluing. You get nicely at work, the glue just right, the stock well warmed, and begin to set up the joints. Just then the outside doors fly open and a team backs up with 1,000 feet of lumber, or the elevator well is opened and 10,000 cubic feet of cold air come up to see how you are getting along. If you intend to do much gluing, just build a room for that alone. Keep it at a temperature of 90 or 100 degrees and you can make good glue joints. There is one example that seems rather paradoxical in regard to gluing in the cold. In heading mills where barrel heads are made, the heads are pieced up with a coarse circular saw, rubbed together and set one side without clamping. All this is done in a temperature ranging anywhere from 15 degrees below to 60 above zero. Very few heads come apart at the joint, although they are all run through a pony planer and the paring-in machine.—*Exchange.*

THE *Builder and Woodworker* says that "among the unfortunate things of our times is the fact that in all branches of industry, as a rule, the workman has only an ordinary degree of skill. He plies his labor as the routine of his work compels, forgetful of the fact that the man of efficiency is marked, and when changes occur he is the one who is retained or advanced as the exigencies of the times demand. As our industries progress, new fields are opened, and the skilled workman is prepared for the emergencies of the hour that bring him a more remunerative labor. There is no need to question possibilities with reference to labor, for certainly its opportunities are without limit. Let every workman master his trade thoroughly and well, for the reward of so doing is not only in self-aggrandizement but in the strength of character that separates manhood from puerility."

Skin-Plumbing and the Architect.

IN discussing the question of plumbers' profits, my sole aim is to agitate the question to the end that good plumbing will be the rule,—not, as now, unfortunately, the very rare exception. Our societies throughout the country are doing a grand work in educating the master plumber to a just appreciation of the importance of his profession, and his responsibility for the health of his patrons; but, in order that we may have good plumbing, the architects' and health department's assistance is of the first importance; without their aid, the profession will ever remain what it is, —a fat, lucrative, healthy (for himself) business for that conscienceless thick-skinned humbug, the skin-plumber,—a fit subject for the sneers and jibes of every alleged joker and would-be smart Aleck. I have never—and I say it with deep regret—been in any society, large or small, where the name of plumber happened to be mentioned but that some one felt called upon to relate his or her experience with the plumber, and how he or she had been treated by that worthy object of their admiration. After very nearly twenty years' knowledge of, and acquaintance with, my fellow craftsmen, I am sorry to say that our bad name is not entirely undeserved. No doubt that deserving object of our consideration, the skin-plumber, sees nothing in all this but a joke; he is quite satisfied indeed to allow jokes or any remarks to pass at his expense, provided, however, there is prospect of an opportunity to retaliate in his own peculiar way; he will double the dose the next time. Give them something real to talk about, to sharpen their wits on; he don't believe in having folks trying to bother their brains about some imaginary wrong-doing of the poor, persecuted plumber. Oh, no! he'll see to it when his turn comes that the joker pays the piper.

Well, how far can the architects help along this good work,—ridding the plumbing business of that "snake in the grass," the skin-plumber? In this way only,—that any master plumber, unknown to them, seeking to figure in their offices, must show good and sufficient proof of ability and honesty in work already performed, from the owners of such work, who have had five year's trial of said work. If the plumber is a beginner, then he must show from his former employer that he is incapable of doing a skin-job, that he has a just pride in his profession; in a word, that he is an honest man. Architects are all interested in, and desirous of having, good plumbing work done. There is no architect who would knowingly employ or give countenance to a skin-plumber who desired to estimate in his office. Why then not insist on having proof, the only proof that counts for anything in regard to plumbing? During the construction of a job of plumbing, or the "roughing in," very few architects can judge intelligently or pronounce conscientiously on a suspicious looking job. It has to be seen with a plumber's eye, if the skin-plumber's practices are to be prevented during construction. A good thorough job is always surrounded by evidences of its completeness; it requires no expert to judge of its merits. But the skin-job, that's the sticker for the architect, to avoid which their only remedy is, select the plumber whose estimate bears evidence of his intention to live up to the specifications, and whose record is proof of his ability and honesty. The average superintendent, or owner, might just as well be superintending a surgical operation, with a view to directing it in all its nice details, as a plumbing job; he knows as much about one as the other. There is a similarity in the comparison, and a very deceiving one. Both the plumbing job and surgical operation may appear all right on the surface, but away down that little something remains undone, which, to the uneducated, botch-plumber, or unskilled physician matters little. But the plumbing doesn't work; the wound doesn't heal; both jobs have to be done again at greater expense and exceedingly more suffering than in the first instance. Then, I say, let the plumber give proof, as the doctor is required to, of skillful and honest practices, or let his practice be so very limited, for the want of something to do, that it will not be necessary for those who are tempted by his only means of getting work (low figures) to be deceived in him. He will then be like the shyster of any profession,—he can be known at a distance.

As I consider that the health department has most to answer for, for bad plumbing, I will leave consideration of its account to a future letter.—*Martin Moylan, in Sanitary News.*

If the reports that are current on terra cotta lumber are true, it seems almost a mystery that it is not manufactured on a more extensive scale. We are told that saw-dust mixed with common clay, pressed and baked, gives the desired product, which admits of nearly all the uses to which true lumber may be put, besides being fire-proof. Would saw-dust, now too often looked upon as a nuisance, not form an important item in the market if it could be utilized in this way? Or is lumber so plentiful yet that we can ignore the utilization of the waste incident to its manufacture? When statistics tell us that the northwestern lumber region alone produced during the past year the tremendous quantity of about 2,534,3 0,000 feet of lumber, 1,059,000,000 shingles, and about 630,100,000 lath, we may well pause and ask how long the supply will be able to meet the constantly increasing demands.

The utilization of the waste products has always been one of the most important sources of income to any industry, and the near future may demonstrate conclusively that lumbering will no longer be an exception to this rule, that attention must be paid to the enormous waste in its production, and that some means will have to be devised to either prevent or utilize it. Gas making from saw-dust awaits further development, terra cotta lumber may serve in this connection a two-fold purpose, and many other inventions will be made as soon as the necessity for such a thing is felt throughout the country. Perhaps lumber is too cheap at present in its original cost, but it will not be like that forever; as the most available portions of woods are cut down, the more inaccessible parts will necessitate larger expenses to bring them to market, and the question of "waste" will assume prominence in proportion to this increased cost, and saw-dust may yet prove one of the most important items of profit to the lumber industry in a similar way as the "gas liquor" of gas works, which the manufacturers did not know how to dispose of thirty years ago, now pays them larger profits than any of their other products. —*The Lumber World.*

Never stand at the foot of a sick bed and survey the patient. All figures loom large to fevered eyes, and by the side of the bed are only partially seen, and do not annoy with the sense of too much presence. Do not open the door very slowly, for then the attention is strained, speculating as to who the next comer can possibly be after all this preparation and with such cautious approach. Low but clear tones, quiet but sure movements, and rapid, rather than slow, are a great relief to any patient who is blessed with a practical nurse. Whispering is torture. Silence is best until you can discuss matters in another room; but if you speak, speak out, and make no mysteries about anything. In severe illness the nurse must watch her patient steadily, but not seem to be looking. In convalescence it frequently soothes the invalid to have the nurse seated at the window, apparently looking out. This frees the faculties from the tension that the sense of being watched usually gives.—*Hall's Journal of Health.*

Choosing Hand Saws.

STIFF blades are made of better material than thick ones, and are less liable to "buckle" or "twist," and are not so apt to break. They require less set, will stand an edge longer, and are not so tiresome to work. They should be hung in plain beech handles with rivets flush or countersunk. The blade should be of a dark color and have a clear bell-like ring when struck with the ball of the finger. Blades of a light iron-gray color are not so good. Never take a saw that jars or trembles in the handle. The first point is to grasp it by the handle and see that it *hangs* right, and that the handle fits the hand properly. Then try the blade by springing it and see that it bends regular and even from point to butt. See that it has a good crowning breast. Hold it at a distance and get a proper light to strike on the blade and you will see if there is any imperfections in grinding or hammering.

THERE should be less pride felt in peculiarity of employment and more in excellence of achievement.

Piece Work.

As a rule the man who is employed at piece-work, excepting in those trades where, from the nature of the work, it is habitual and general, is more spasmodic and less regular in his work than the day worker; he frequently runs himself aground, and then he uses stimulants to assist him in keeping up the speed. He can often take an hour or a day, and by dint of driving will contrive to make it up, at least in part, during the rest of the week. This kind of work is not a fair test of a man's abilities; what is wanted is a fair average day's work, taking one day with another all through the year. Piece-work, as a rule, will not give this. If an engine-driver lingered on some part of his journey and then forced his engine at high pressure over the other part, he would be regarded as a dangerous and reckless fellow, to whose care the lives of passengers should not be intrusted. Regularity is required, as well as speed, in all trades and occupations, for the moral in the fable of the tortoise and the hare is as applicable in the case of labor as it is in every other department of life.

Again, when the price of a certain job is fixed on the piece-work principle, the employer usually takes the quickest workman for his sample and test, and calculates the price accordingly; by this means he tries to fix a maximum price for the worker, the less expert workman falling below that price in proportion to his lack of power to compete with the strongest. This seems fair enough on the face of it, but it is not so fair as it seems, for the strong man will *tax* his strength to earn as much as he can, while the weaker will *overtax* his in order to compete and to enable him to earn anything like decent average wages.

It is the old tale, after all, of the employer's trying to fix a maximum wage, and the workmen trying to fix a minimum; if employers are justified in seeking the one, the workmen are equally justified in trying to enforce the other. Moreover, by means of piece-work, employers are often able to cause wages to fluctuate—with a tendency ever downwards; for if a man earns a few shillings over the current wages of the district, the conclusion usually is that the price paid is too high and must be reduced, hence an effort is perpetually being made to lower the wages. Again, each man is more isolated, and as a consequence weaker, and therefore more likely to be compelled to accept the reduction because he is detached from his fellows. This is the secret of some employers' love for piece-work, and of their desire to enforce it whenever practicable; and this is precisely the reason why the workmen strive to restrict it, as far as possible, within the narrowest limits. The mode of fixing the price is one great obstacle to its universal adoption; another is its inapplicability to many of the industries of the country.

Another evil in connection with piece-work is the tendency to "scamp" the work; the chief interest a man has in his work is to get it done, and receive the wages; beyond that his interest is *nil*. This is the reason why all the best work is done by the day, skill being more requisite than speed—the man has time to finish his job in all those small details which make true workmanship, and distinguish a real work of art from the ordinary productions of the workshop. It is useless to talk about a man's pride in his work; he will take as much pride in it as he can afford, neither more or less; if art workmanship be required, it must be paid for; time is often the equivalent of skill; if the former be denied, the latter cannot be effectively exercised.—*Carpenter.*

Paint for Protecting Roofs.

THERE are frequent inquiries about the use of coal tar paints for roofs, and all over the West parties are patrolling the villages with their stink-pots of coal tar, and swabbing every roof they can gain access to. I have had twenty years' experience in the use of coal tar mixed with ground slate, iron ore, mineral paints, and the so-called asbestos—all about alike—and I know what I am talking about. They are unfit to use on wood or tin. They will cause wood shingles to crack and curl, and tin to corrode. A gentleman of utmost reliability has just told me that two new shingle roofs were last fall covered with a preparation of coal tar, petroleum and ground slate, and they are ruined—the shingles have curled up, and the owners are preparing to new-roof the buildings.

To make a desirable cheap roof paint, take four pounds yellow ochre, one venetian red, and add a little white lead and a very little lamp-black—the last two ingredients to improve the color simply—and mix with raw linseed oil. The lamp-black should first be mixed or ground in a little oil so as to mix smoothly with the rest. This will make a durable paint, costing less than seventy cents a gallon at the present price of oil, and can also be put on with a good whitewash brush, or a wide flat brush costing about seventy-five or eighty-five cents.

However valuable coal tar may be for some uses, it is not fit to be used on shingles, or ood exposed to the sun or weather.—*Charles Betts.*

THE AILANTUS.—Many complaints have been made of the overpowering and offensive odor of the flowers of the ailantus trees planted in the streets of Paris and other large cities. According to M. E. André, it is only the flowers of the male trees which exhale this unpleasant scent, and he recommends that none but female trees should be for the future planted in public or other places where the peculiar odor of the males might be offensive. This would seem an important point for Americans and others who plant the ailantus largely as a street tree.—*Woods and Forests.*

Our Exchanges.

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OF SAN FRANCISCO
Room 11, 314 Montgomery St.

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O.—Mark Sheldon.
A.—Wolfe & Son.
C.—Riley & Loane, masons.
$80,000.

Camp, bet. Second ave. and Guerrero. One-story frame.
O.—Jac. Ellison.
A.—Wolfe & Son.
Day's work.
$1,400.

Twenty-third, nr. Alabama.
O.—M. E. Church.
A.—Wolfe & Son.
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$1,300.

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O.—J. Schweitzer.
A.— — Kenitzer.
C.—Moore Bros.
$3,000.

Page, cor. Laguna. Three-story frame.
O.—Miss M. E. Green.
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$4,650.

Mission, corner Twenty-fourth. One-story frame.
O.—McDonald & Co.
C.—W. H. Barrett.
$1,400.

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O.—H. Holman.
A.— — Gailfuss.
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$7,000.

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$3,500.

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O. and B.—P. Kennedy.
$1,300.

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$2,500.

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O.—Mrs. Foster.
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$1,200.

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O. and B.— — Claybour.
$12,000.

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O.—Mrs. Kennedy.
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$3,000.

Seventeenth, nr. Sanchez. Additions.
O.— — Worrell.
A.— — Swain.
C.—Terrill & Slaven.
$2,500.

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O. and B.— — Dotsie.
$1,500.

Castro, nr. Market. Two-story frame.
O.— — Brady.
A.— — Daley.
$3,500.

Market, nr. Castro. One-story frame.
O.—M. C. Gimpel.
C.—G. Knopf.
$1,500.

Sixteenth, near Market. Two-story and basement.
O and B.—M. Arrion.
$3,000.

Noe, nr. Market. One-story frame.
O.— — Shannon.
C.—McMillan & Kean.
$600.

Noe, nr. Fifteenth. One-story frame.
O.—F. H. Merrill.
C.— — Grant.
$2,500.

Sixteenth, near Sanchez. Two-story frame.
O.—Mrs. Henniby.
C.— — Marrisy.
$2,000.

Seventeenth, bet. Mission and Valencia. Three two-story frame buildings.
O.—Wm. Cæsar.
A.—M. J. Welsh.
C.—J. Smith.
$7,000.

Broadway, near Hyde. One two-story and one one-story frame.
O.—L. M. Welsh.
C.—A. N. Nelson.
$3,000.

Mason. Additions.
O.—J. Burke.
$750.

Stevenson, nr. Ninth. Additions. Two-story frame.
O.—P. Maher.
A.—G. Miller.
C.—T. Sullivan.
$3,300.

Twenty-fifth, cor. Capp. Two-story and basement.
O.—Capt. A. Hall.
C.—Day's work.
$4,000.

Columbia, bet. Twenty-second and Twenty-third. One-story frame.
O.—M. Hoar.
C.—Day's work.
$1,200.

Twenty-third, nr. York. Two-story frame.
O.—T. Skilly.
Day's work.
$2,000.

Sixteenth, cor. Utah. Additions.
O.—H. Fischbeck.
Day's work.
$1,500.

Brannan, nr. Fifth. Two-story frame.
O.— — Johnson.
Day's work.
$1,600.

Silver, nr. Third. Additions.
O.— Mrs. Medcalf.
C.—A. Zihn.
$1,100.

Eddy, bet. Franklin and Gough. Two-story frame.
O.— — Levy.
A.— — Geddes.
C.—T. H. Day.
$12,000.

Central Avenue, nr. California. One-story and basement.
O. and B.—J. McClellan.
$800.

Pine, nr. Lyon. One-story frame.
O.—J. Bird.
C.—J. E. Logan.
$2,000.

Pine, nr. Baker. One-story frame.
O.— A. Levill.
C.—Bigelow & Son.
$1,000.

Baker, nr. Bush. One-story frame.
O. and B.—Robert Hocken
$1,500.

Bush, nr. Baker. One-story frame.
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$1,500.

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O and B.—Easton Bros.
$500.

Sutter, nr. Devisadero. One-story frame.
O.—H. J. Bedsold.
C.— — Main.
$2,000.

Ninth, cor. Mission. Two-story frame.
O.—F. Breen.
A.—A. Munn.
Day's work.
$1,000.

Mission, near Fifteenth. Two-story frame.
O.—Richard Roller.
C.— — Bradly.
$2,000.

Mission, near Thirteenth. Two-story frame.
O.—D. C. Fox.
C.— — Buckley.
$800.

Bush, nr. Hyde. Three-story frame.
O.—M. Petorelle.
A.—Geo. E. Voelkel.
C.—T. H. McKay.
$8,000.

Bush, cor. Hyde. Three-story.
O.—Mr. Gascow.
A.—W. Mooser.
C.—David Pare.
$9,000.

Tyler, nr. Fillmore. Two-story and basement.
O.—Mr. Farthon.
A.—W. Mooser.
C.—Mr. McKay.
$6,500.

Mason, nr. Greenwich. Two-story and basement.
O.—Arrata & Ratto.
A.—W. Mooser.
C.—Rocca & Co.
$5,000

Eighteenth, cor. Jessie. Two-story and basement.
O.—Mr. Underwood.
A.—W. Mooser.
C.— H. A. Sheldon.
$6,500.

Pine, bet. Devisadero and Broderick. Two-story and basement.
O.—Mr. Benjaman.
C —J. Tredwell.
$4,500.

Post, cor. Stockton. Union Cub Building. Four-story and basement.
O.—Wm. Walkerley.
A.—Wright & Sanders.
C.—Frank Barker.
$300,000.

Seventh, near Howard. Three-story frame, brick basement.
O.—August Hildebrand.
A.—H. Geilfuss.
C.—Henry Thom Wohrden.
$14,000.

Mission, nr. Nineteenth. Two-story frame.
O.—Mr. May.
A.—H. Geilfuss.
C.—M. Grant.
$4,200.

Twenty-second, near Harrison. One-story frame.
O.—Mr. Duclos.
A.—H. Geilfuss.
C.—T. Mitchell.
$1,600.

Mission, bet. Eleventh and Twelfth. Three two-story flats and store.
O.—R. Brennan.
A.—T. J. Welsh.
C.—J. Blake.
$7,500.

Morrel Place, nr. Broadway. Two-story flats.
O.—Mrs. Prince.
A.—T. J. Welsh.
C.— — Nelson.
$1,700.

Fourteenth, nr. Guerrero. Two-story.
O.—Mr. McCarthy.
A.—T. J. Welsh.
C.— McElroy.
$2,100.

Sansome, cor. Broadway. Lodging house and stores.
O.—P. Creagan.
A.—T. J. Welsh.
C.—Jas. Hayden.
$6,000.

Washington, above Mason. Reconstruction. Two-story.
O.—S. Levy.
A.—F. Hillert.
C.—J. E. Dunn.
$3,500.

Clay, cor. Polk. Two two-story frames.
O.—C. D. Cushing.
A.—Curtis & Bennett.
C.—D. B. Spangler.
$4,800.

O'Farrell, west of Fillmore. Two-story and basement.
O.—A. Levy.
A.—B. McDougall & Son.
C.—A. Jackson.
$7,000.

Vallejo, bet. Mason and Powell. Two-story frame.
O.—A. Kauhmann.
A.—Wm. Schrof.
C.—R. Morton.
$2,250.

Polk, bet. Eddy and Turk. Two three-story frames.
O.—Hohn & Saxtorph.
A.—Wm. Schrof.
C.—Day's work.
$11,500.

Sutter, nr. Franklin. Two three-story frames.
O.—Mrs. A. Lezinsky.
A.—J. Marquis.
C.—L. Wagner.
$20,000.

Beale, nr. Market. Four-story brick.
O.—Hobbs, Wall & Gilmore.
A.—Percy & Hamilton.
C.—Mason, — Cox; carpenter, — Fletcher.
$26,000.

Main, nr. Market. Four-story brick.
O.—Hobbs, Wall & Co.
A.—Percy & Hamilton.
C.—Mason, — Cox; carpenter, — Fletcher.
$27,000.

Montgomery Avenue, cor. Broadway. Alterations.
O.—L. Duterit.
A.—Huerne & Everett.
C.—J. McCann.
$1,800.

Ellis, bet. Powell and Mason. Three-story and basement.
O.—W. J. Turndal.
A.—H. D. Mitchell.
C.—R. McCann.
$10,000.

Broadway, cor. Mason. Three-story.
O.—A. Garrigan.
A.—T. J. Welsh.
C.—J. L. Binet.
$6,000.

California, No. 104 (rear). Additions.
O.—Parrott Estate.
A.— — Raun.
C.—Butler & McGowan.
$1,500.

Washington, cor. Spofford Alley. Four-story frame brick basement.
O.—Masson Bros.
A.—B. E. Henriksen.
C.—W. Kreyer.
$12,300.

Eddy, cor. Octavia. Two-story frame.
O.—A. Kutner.
A.—Schmidt & Havens.
C.—P. Crichton.
$12,000.

Dolores, bet. Twenty-third and Twenty-fourth. Two-story frame. Three two-story flats and store.
O.—W. S. Davis.
A.—Schmidt & Havens.
C.—I. N. & J. G. Day.
$4,500.

Valencia, nr. Twenty-sixth. Two two-story frames.
O.— — Schumacher.
Day's work.
$6,000.

Clay. Two-story frame.
O.—Mrs. Fuller.
A.— — Cleland.
C.— — Prodgers.
$5,000.

Folsom, bet. Twenty-fifth and Twenty-sixth. Two-story frame.
O.— — Potter.
Day's work.
$3,500.

Stevenson, bet. Eighteenth and Nineteenth. Additions.
O.—P. Boyhen.
A.—M. J. Welsh.
C.—A. A. Newbert.
$1,500.

Guerrero, bet. Nineteenth and Twentieth. Two-story frame.
O.—Thos. Neary.
A.—M. J. Welsh.
C.—Buckley & Bergman.
$3,500.

Larkin, nr. California. Two-story frame.
O.—W. W. Stow.
A.—Schmidt & Havens.
$10,000.

Page, bet. Pierce and Scott. Two-story frame.
O.—Jacob Petersen.
A.—M. J. Welsh.
C.—W. Fitzpatrick.
$3,300.

Jessie, bet. Eighteenth and Nineteenth. Two-story frame.
O.—M. McQuade.
A.—M. J. Welsh.
C.—Doyle & Grace.
$3,000.

Buchanan, cor. Ivy Ave. Two-story and basement.
O.—William Murz.
A.—R. R. Warren.
C.—Hatfield & McRea.
$3,800.

Geary, bet. Jones & Taylor. Three-story frame, brick basement.
O.—P. Gordon.
A.—R. R. Warren.
C.—Batemen Bros.
$6,000.

Fifth Avenue, bet. Harrison & Bryant.
O.—E. Sharkey.
A.—R. R. Warren.
Day's work.
$3,500.

Winters—Wolfskill, cor. Second. One-story frame improvement. O., George Johnson; $1,600. Two-story frame. O., H. C. Goodyear; C., Ritchie & Ward; $1,500. New Railroad Depot, C. R. R. Company; $1,000.
Madison—Two-story frame improvement. O., George Stevens; C., R. B. Nisson; $1,500.
Capay—Frame Church; day's work; $1,500.
Stockton—Two-story and basement. O., Chas. Belding; A., W. G. Copeland; Day's work; $15,000.
Niles—Building for California Nursery Co. A., Lensen & Son; C., S. W. Easterday; $3,150.

MISCELLANEOUS.

San Rafael—O., H. Logan; A., T. J. Welsh; C., Kill & Hobson; $6,000.

Woodland—O., Geo. St. Louis; A., T. J. Welsh; C., Thompson & Co.; $5,000.

Eureka—First Section Eureka Court House. A., Curtis & Bennett; C., — Simson.

Oakland, Tenth, cor. Oak. Two-story frame. O., J. M. Bullington; A., G. A. Bordwell; C., Gray & Stover; $9,000. One-story frame. O., Baptist Church; A., W. G. Copeland; $4,000.

Napa—Two-story frame. O., Capt. Pinkham; A., J. Margolis; $4,000.

St. Helena—Two-story brick. O., Odd Fellows Hall; A., A. Schroffer; C., G. Kennedy; $16,000. Two-story basement. O., R. H. Sprott; A., A. Schroffer; $5,000.

San Jose, Stockton Avenue. One-story frame. O., J. Bergstrom; A., J. O. McKee; C., J. C. Clinton; $1,700. Third, cor. Julian. Two-story frame. O., J. Rinaldo; A., J. O. McKee; C., Vincent & Drew; $5,000. Two-story frame. O., J. Stock; A., Lenzen & Son; C., E. A. Van Dalsen; $9,000. Two-story frame. O., J. Tulley; A., Lenzen & Son; C., J. M. Martin; $2,362. Two-story stable; O., C. W. Breyfogle; A., Lenzen & Son; day's work; $1,500. Two-story frame school-house (Hester School District). A., Lenzen & Son; C., H. C. Skow; $11,088. Improvements at Fair Grounds. A., Lenzen & Son; $1,600.

Woodland, Main Street. Two-story iron and brick; five stores and hall. O., T. M. Prior; C., Iron, Woodland Foundry; brick, D. R. Scott; wood, Glen & White; tin and plumbing, P. W. Burns; $25,000. Main. Two-story brick. O., J. J. McIntyre; A., T. J. Welsh, C., S. Caldwell; $6,000. Two-story brick; O., G. C. St. Louis; A., T. J. Welsh; C., Henderson & Co.; $6,000. One-story frame improvement. O., Capt. W. H. Wood; C., Gilbert & Son; $1,500. College Ave. One story frame. O., Thomas Armstrong; C., A. Blake; $1,000. First. Two-story brick improvement. O., A. D. Porter; C., Glen & White; $1,200. Second. One-story frame. O. and B., S. Caldwell; $2,000. Fourth. One-story frame improvement. O., Mrs. E. R. Moses; C., D. F. Myers; $1,000. Fifth. Two-story frame. O., A. and B., W. E. Perreau; $4,000. North. One-story frame. O., M. Autzen; $1,000. One-story frame improvement. O., Da. Grigsbey; C., J. Caldwell; $1,000. First. One-story frame. O., Robert Moore; C., Stamp & Myrick; $1,200. College Ave. One-story frame. O., W. L. Manor; C., Poole & Sears; $1,000. One-story frame. O., W. D. Holcomb; A., T. J. Welch; C., W. H. Winne, $2,000. East Ave. One-story frame. O., A. Merit; $1,300.

The California Architect and Building News.

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NUMBER 4.

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Advertisements alone inserted that refer to materials used in the construction and furnishing of houses, and to matters and trades belonging to the building interest.
NO OTHERS RECEIVED.

Monthly Summary of Building Improvements.

A larger number of buildings have been erected during the past month than for any other similar period on record.

We hear of dullness in every branch of business excepting those that are directly connected with the building interest. The glorious showers since the first of the month have caused even the merchants to put on a more happy look, while the mechanics' faces fairly beam at the prospects ahead.

We have made many inquiries in regard to the *real cause* of the building boom, but confess we are not satisfied with the answers received. Many attempt to explain that it is owing to the low price of building materials—not a satisfactory answer as we can prove. The price of lumber is, at the time of writing, $15.00 per thousand for rough, and $30.00 for surfaced.

In the flush times of the lumber pool, the prices were on the list $21.00 and $40.00. Now forty thousand feet of lumber will be sufficient for quite a large size dwelling. Allowing half of that amount for rough, and the balance for surfaced lumber, it would only make a difference of

THREE HUNDRED AND TWENTY DOLLARS

In first cost of lumber on a house worth probably $10,000. Most assuredly not enough to cause an owner to erect a building, merely to save difference in lumber between cheap rates and pool rates.

Again, hardware is now fully 20 per cent. higher than it was one year ago. Plastering is worth 2 cents a yard more now; with the exception of bricks, there is no article—wages included—that is not as high, and in many cases much more costly than they were in the closing months of 1884.

If it was the low price of building materials alone that keeps up the boom, every one would have used their greatest endeavors to build when the price of lumber was actually below the cost of manufacture, viz., $12.00 per thousand; the erection of buildings would have proceeded very briskly for a month or two, and then come to a sudden cessation. But

MONTH AFTER MONTH

There has been an average of four new buildings started for every working day in the month; and this average has been maintained for *seven consecutive months.*

Again, it has been stated that the low rate of interest allowed by the savings bank has induced many to put their savings into real estate and improvements thereon. A careful inquiry at the banks does not show this to be the case during the past month. The number of depositors still is on the increase, while the amount drawn is not in excess of the average.

We think the true cause of the boom lies in the fact that there is a

STEADY GROWTH IN THE POPULATION

Of this city. Manufactories have largely increased in number for the past few years, and have been the means of largely increasing the number of steady inhabitants. The cable lines are exerting a beneficial influence in keeping residents on this side of the bay. Our "glorious climate" attracts numbers from the East, who come for a spell, and then are so pleased at our resources, that they invest in our real estate as offering superior inducements for large profits. The main growth of the city is in the neighborhood of the Park

AND AT THE MISSION.

There are less vacant houses to rent at the Mission than in any other section. There is a beautiful valley facing the Industrial School that needs but one thing to make it the most thickly settled part of the city, and that is

CABLE CAR ACCOMMODATIONS.

From Twenty-sixth Street out to the county line, the distance should be traveled by means of a cable line. The speed from Twenty-sixth could be made much greater than from that point to the ferry. Cars should also be run from 5 o'clock in the morning, to enable workmen of every occupation to be at their work on time. Again, the price of tickets should be reduced to

SIX FOR TWENTY-FIVE CENTS.

If the above suggestions were carried into effect, we think that hundreds now going across the bay on account of cheap rents would locate on this side, and save much of the time now consumed in a trip by rail and boat of five miles and over.

SUMMARY.

During the month ending the tenth of April, there have been commenced in this city the very large number of

178 BUILDINGS, OF THE VALUE OF $1,221,045,

By far the greatest in number and value ever recorded for one month. To summarize:—

158	frame buildings—value	$718,095
2	brick " "	451,500
18	additions	51,450
178		$1,221,045

San Francisco Chapter American Institute of Architects.

THE regular monthly meeting of the Chapter was held in its rooms on Friday evening, April 3d. In the absence of the President, H. C. Macy occupied the chair.

The following report was received from the committee on classes:—

To the San Francisco Chapter of the American Institute of Architects:—

GENTLEMEN: Your committee, the teachers

of the architecture classes of the San Francisco Chapter, beg leave to submit the following report:—

They regret to say that, from unavoidable causes, two of the three classes which have been in progress for the current year have been suspended for the present, and it is thought unadvisable to resume them until some more satisfactory arrangements can be made in regard to them than is at present possible. The class in drawing is still maintained, and will be until further notice. The attendance on the classes has not been as satisfactory for the present year as could have been wished. Those who do attend, however, are tolerably regular and very diligent in their work; all are making commendable progress and are acquiring greater accuracy and better knowledge of their work.

To secure success in these classes it is thought that much would be gained by having a room properly appointed and furnished, in which the students could feel at home, and which could have the various conveniences not possible in a private office, such as, for drawing, good lighting, abundant space, and a good supply of models, copies, etc.

For the mathematical class, blackboards, proper apparatus for calculating strains, testing model girders, model bricks, and other model building appliances.

For the architectural class (practical), such plates, paints, drawings, and models as may best serve the important interests to which this class is devoted.

For all, proper periodicals and publications, which, being provided for the students, might engage their attention and broaden their ideas on matters of unusual interest connected with the profession.

The above are the views of only one member of the committee, the others not having reported. Respectfully submitted,

G. H. SANDERS.

The above is also endorsed by John Gash.

Report accepted, and ordered to be spread in full on the minutes.

A voluminous report was received from the Parent Chapter in regard to the supervising Architect of the State Capitol at Washington. A committee of three was appointed to thoroughly investigate the subject and report at the next meeting. The president appointed as such committee, Fellows John Gash, T. A. Eisen, and R. H. Daley.

The Committee on Indentures presented a full report, including two different forms of articles of indenture for apprentices. Report received and action thereon postponed until next meeting.

Mr. Gash read an interesting paper upon the subject, "THE SQUARE AS A FACTOR IN ARCHITECTURE AND GEOMETRY." Thanks of the Chapter were tendered to Mr. Gash for his able effort, and the paper was ordered printed in full in the CALIFORNIA ARCHITECT AND BUILDING NEWS. [It will be found in another column of this issue.—EDS.]

Men That Are North Winds or Western Gales with a Notification to All to Lie Low.

"HERE, there, don't you give but four blows to send that 8-penny nail home;" and then, without stopping to see whether the confused workman gives one or a dozen blows to drive the next nail to its head, the RUSHING (?) FOREMAN stumbles over a bunch of shingles in his hurry to tell another man—"Better file your saw sharper so you won't be all day cutting that *jice*."

Another workman who has just finished a 3-inch mortise through a very tough pine knot, and whose perspiring brow proves that he has been hard at work, happens to be met while, for a few seconds, he is wiping off the perspiration, with—"You going to stand there all day doing nothing;" and before the astonished workman knows who has spoken, the RUSHING FOREMAN has disappeard around the corner of the building.

Foremen of this character are extremely obnoxious to workmen. Beginners or apprentices are made so nervous that, for some little time after the suddenly spoken words, they are unable to do anything, and, in many cases, it takes half a day for them to regain their equilibrium. Old stagers, however, are worthy of attention by a looker-on after the visit of a cyclone foreman. We have carefully examined the different phases of character as presented in our various phrenological journals but we have failed to observe one that adequately expresses the mingled contempt, hate, go-to-the-devil look, that overspreads the countenance of the true mechanic. The plans of the latter are entirely upset by the unwarranted remarks of the foreman. But the greatest evil befalls the apprentice, for he is led to believe that a great noise and show of work is all that is necessary to please the boss; and so nails, in rustic or flooring, are sent home with three blows, utterly regardless that the head of the hammer makes many indentions in the wood, which, before painting, must be smoothed off, thus giving treble work, simply that the term *rusher* may be applied to their names.

Another great trouble with the kind of foreman under consideration, is his inability to give explicit directions just how he wants to have work finished. His mind is so intent on having all the work going on at a locomotive gait, that he turns from the boss of the framers before he has explained his wants, to tell the roofers what he wants done in their line; and then with a hop, skip, and jump, he is up in the second story trying to show the workmen there how partitions are to be set; then while gently mopping his forehead with his shirt sleeve, he prides himself upon his ability to give distinct orders, if necessary, to twenty different men in as many minutes.

The rushing foreman also inculcates another bad habit among the workmen. While he is around, the men feel strung up like a newly wound clock, but when he is away, a natural relaxation follows, and a positive don't-care-if-I-don't-work feeling is experienced, that, in a short time, becomes a habit, and, necessarily, leads spectators to exclaim, "That gang of men needs watching."

A few such foremen as we have described may be found in this city. They command no respect from the men under them, and, as a rule, they do not get as much work done as a man who is less noisy and demonstrative in the method used to have every workman know just what is to be done and the time necessary to perform the same.

Cause of the Depreciation in Our Lumber Market.

IT is a source of no little inquiry among our people as to what has demoralized the lumber trade during the past six months. As is well known, there existed for some time previous to the late break in prices, a combination among manufacturers to regulate prices by limiting the supply. The California market will consume annually 150,000,000 feet of redwood lumber. To supply this demand each manufacturer was allowed a certain quota, to be shipped to San Francisco, all the redwood lumber arriving in that port being, to all intents and purposes, sold through the agents of the combination. Last fall it was found that at least 20 per cent. more than the market would take would be produced the coming year, and it was proposed to reduce the quota allowed each manufacturer 20 per cent., and thus hold the market at the figure which had prevailed for two years past, giving the mill men good profits and enabling them to employ a larger number of laborers at good wages, thus making business lively in all the lumber regions. Several of the Mendocino lumber manufacturers refused to accede to the 20 per cent. reduction of their quota, and sold their lumber under the combination price, and thus the market was broken. Others in the association said, "Well, it is now every man for himself;" and the price has been gradually getting lower and lower, until now redwood lumber is being sold in San Francisco at less than the cost of manufacture and transportation. It is claimed that this state of affairs can be but temporary, and matters will sooner or later come back to a legitimate business basis—with some manufacturers many thousands of dollars out of pocket. The best informed manufacturers of lumber tell us the demand is quite up to the average, and if it had not been for the circumstances above related, the lumber trade would now be as good as it has been at any time within the last three years. There is a slight dullness at present in the foreign demand for what is known as large, rough, clear, suitable for export. This latter is a branch of the redwood lumber trade, which is supplied almost exclusively by Humboldt County, and renders her manufacturers independent of the home market to a considerable extent. Our lumber dealers feel the effect of the temporary depression in the California market, but take a hopeful view as to a readjustment of prices and better times.

MODERN FLATS.—ELEVATION OF A DESIGN COSTING $4,500.

Strength of Materials.

IT is possible, indeed it is probable, that man in the pre-historic ages was endowed with a superior and peculiar mathematical faculty, enabling him, without figures or geometric formula, to estimate cause and effect better than we. Again, the power required to elevate these gigantic stones to position in their temples seems at first glance to leave all our system of craner and other hoisting appliances far in the rear in point of power and efficacy, but when we take into consideration the facts proved by modern geological research, that the sites where these massive models of antique architecture are found, show unmistakable evidences of being once occupied by hills, the problem is not so difficult of solution, inasmuch as there are many reasons for concluding that before the foundations were laid, a lofty hill was selected, hollowed out, and the entire edifice, with i s massive lintels and domes, was erected on the inside; thus the heavy and light substances were elevated by means of the hill's incline, taken to the top, and from there placed in position, and when the structure was completed, the hill was raised, and the building appeared as represented to-day in the crumbling mass of ruins found throughout Egypt and Asia Minor.

Again, architects who have had the good fortune to visit these places have wondered at and admired their arches, placed in position at a time when levels, squares and equilibriums were supposed to be unknown, and the laws of frictional contact and pressure unheard of. At the present time their investigations are conducted with the greatest difficulty, notwithstanding the fact that the most eminent mathematicians of the age have striven to render the solution easier by introducing certain pre-supposed conditions; thus, in the published treatise on nearly all their architectural theories, from the standpoint of the mathematician, the structures of arches and curves are regarded as consistng of *courses of stones* resting on the abutments, and carrying a load which is supposed to press only in the direction of their imaginary lines. Then, again, cohesion and friction are often entirely ignored in the calculation of pressure and strength of the materials used; in short, many investigations are conducted upon the supposition that the materials could slide freely upon each other.

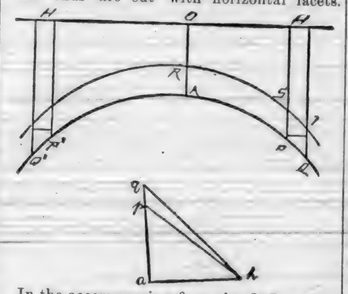
It has been proven, to the satisfaction of the more advanced school of architecture, that if the line of pressure of one stone against another, for instance, cross their mutual surface perpendicularly, there is no tendency to slide; hence if this known knowledge of physical conditions be observed throughout the entire structure, complete stability and permanence of position must ensue, inasmuch as the entire friction and consistency of the cement contributes to this attainment.

In the light obtainable from this, it is plain to be seen that if, in any case, this line of pressure should cross the mutual surface obliquely, the tendency to slide by this pressure must be counteracted by the cohesion of the particles constituting the materials used, and by so doing the actual firmness of the structure would be impaired.

Now if an investigation is conducted on the supposition that the cohesion of particles is to be ignored, then we are led to the best possible construction. The best authorities on this matter do not recognize the pertinency of the conclusion based on the hypothesis that the superincumbent load presses only downwards in accordance with the course prescribed by this lien alluded to in the foregoing. In order to place such a supposition in accordance with the facts of the case of arches, the inner ends of the arch-stones would have to be dressed with horizontal facets for the purpose of receiving and transmitting the downward pressure. But if, as is usually the case, the inner surface be oblique, they cannot transmit a vertical pressure unless in accordance with the law of cohesion, besides which this hypothesis of only downward pressure on the arch-stones is at variance with the fundamental principles of stability; hence in a thorough investigation, this hypothesis must be ignored, and the oblique pressure on the inner ends must be taken into account and the force recognized.

In view of the fact that the depth of these arches is small as compared to the dimensions of the structure as completed, and since the lien of the pressure transmitted from one to another must always be *within* that depth, it is reasonable to suppose that, for the purpose of analyzing the strain, that they form an exceedingly thin course, and that their joints are everywhere normal as regards the divergence from the square. Eventually, however, this depth must be carefully considered and the importance recognized in our calculations.

As the most comprehensive manner to obtain a clear view of our argument, we will examine the following sketch, first assuming that the superincumbent load presses only downward on the arch-stones, or that their inner ends are cut with horizontal facets.



In the accompanying figure let Q' P' A P Q represent such an arch placed equally on the two sides of the crown A, then the entire weight of the structure included between the vertical lines P' H' and P H must be held up or supported at P' and P, so that the downward pressure at the point P must be the entire weight of the structure imposed over A P. This pressure downward is accompanied by a tendency to separate the supporting points P' and P; thus, as this tendency is horizontal, its intensity cannot be changed by the load acting only downward, and must remain the same throughout the structure, whereas the actual pressure at p must be found by combining this stable or fixed horizontal thrust with the downward pressure equal to the weight of the bridge from A to P. In view of this if we draw a h horizontally to represent this constant thrust, and a p upwards to represent the weight of this portion of the arch, the line p h must, in accordance with the law governing the composition of pressures, indicate both in direction and in intensity the actual strain at the point P; this pressure must be perpendicular to the *joint* of the stones, and therefore must be parallel to the straight line drawn to touch the arch at P.

By virtue of the foregoing, if the form of the inside of the arch, or the *intrados*, be prescribed, it is easy to discover and estimate the power of the law of the pressure and its various parts; thus we may find the strain at the point Q by simply applying there a tangent to the curve, and to draw h q parallel to the same; h q represents the oblique strain at Q; a q represents the entire weight from the crown A to Q, and therefore p q is proportional to the weight imposed upon the portion P Q of the arch.

So long as the structures are confined to small dimensions, it is not necessary to incorporate such nicety and technical mathematical calculations in our calculations, inasmuch as in adaptation of the parts the friction of the surfaces, and the cohesion of the mortar are sufficient to compensate for any impropriety of arrangement. The great aim and object of Americans at the present time seem to be very large and massive structures. In eligible, desirable locations, ground surface is scarce and dear, and unlike some of the larger European cities, our workers will not, at least do not, labor below ground; the air and space above to infinity belong to the purchaser of the plat, hence we are building high and massive structures—not too high or too massive by any means—but to avoid these mysterious and fatal catastrophes that occasionally shock the entire country, attention must be paid to these minor and minute technicalities suggested in the foregoing.

The strength and intensity of these various strains must needs be carefully considered. The strength from all attainable standpoints of the materials used are within the reach of all, and before the Architects of America can hope for a full realization of their rising hopes and anticipations to acknowledge no superiors in older countries, or among prehistoric ages, they must master these laws governing strengths, pressures, and strains in all phases; then, and not till then, ages yet unborn will wonder and admire the achievements of the Architects of this, the nineteenth century, the boasted era of civilization and a high order of faculty development.

Our Illustrations.

THE elevation and plans of a modern flat, costing $4,500, will be found on pages 57, 59 and 61. The plans are sufficiently plain to give any one a thorough idea of the arrangements of rooms, etc. Sizes are distinctly marked, as well as the various accommodations usually found in houses of the character shown.

Business Changes.

THERE have been quite a number of changes in the location of Architects during the past few weeks, the principal of which are the following:—

Albert Pissis & W. P. Moore have formed a partnership. Their office is located at 217 Sansome.

Bennett & Curtis have dissolved partnership, the latter retaining the old offices at 528 California; Mr Bennett may be found at 431 California.

H. D. Mitchell has moved to 126 Kearny, corner of Sutter.

Newsom & Gash have dissolved partnership. Each retains an office in the same building where they have been so long together.

T. D. Newsom, of Oakland, has formed a partnership with his brother, John J. Newsom, and they may be found at 431 California.

W. Mooser has moved to 334 Kearny, near Pine.

Swain & Cleveland have dissolved partnership. Each retains an office in St. Ann's Building.

The Building—Labor Market in San Francisco.

BRICK MASONS.

THE demand for journeymen brick-layers is, and has been such for months past, as to absorb the entire supply of good hands, on brick buildings and the better class of work. Every knight of the trowel worthy the name, is employed, with well-assured prospects of continuance the season through. The outside, second-rate men, both as contractors and journeymen, are also generally employed on light foundations, chimney work, etc.

CARPENTERS.

Notwithstanding the large number of buildings under way, the supply of journeymen carpenters is easy, some not being able to find more than temporary employment. This is owing to the great influx of men from other parts of the country, attracted hither by the reports of a "building boom" in San Francisco. The entire resident class of good workmen, and many of more recent coming among us, are steadily employed, with fair prospects for months to come; but with the probability that there will be some letting up in building activities before the close of the year,—a prognostigation based upon the fact that the number of buildings erected in the recent past, has been greater than the increase in population, and the demand for houses,—consequently the "To Let" signs, which are becoming numerous, will be apt to check the ardor of some who would otherwise build as an investment, or for personal or speculative purposes.

PLASTERERS.

As a matter of course, these also, as a class, are full of work, and frequently difficulties are encountered in this branch of house building, not so much on account of insufficiency in number, as in the moral status and habits of the workmen, many of whom love the overflowing mug—of beer—more than they do the development of muscle, through the masterly use of the trowel.

The Lathers, a distinctive branch of the plastering work, very often cause delay, by demands for higher pay, or deliberate refusal to do anything for one or several days consecutively, as the result of "pure cussedness," a disregard for their own, their employers', or the owners' interest.

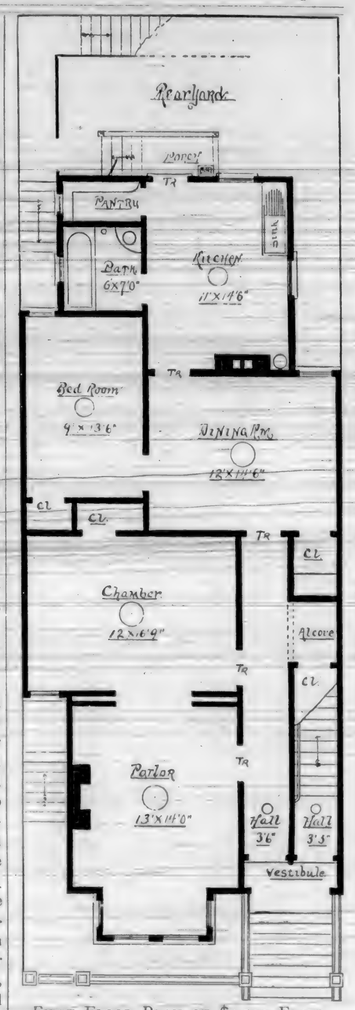
GENERALLY.

With existing lively times, all—painters, plumbers, and all others engaged in building pursuits—are correspondingly busy, and will so continue until the "letting up" times come, with this as a future result, that the best men mechanically and *morally*, will be continued, and those less skillful as workmen, or otherwise faulty, will have to meet the discomforts and misfortunes of non-employment.

Death-Dealing Dish-Cloths.

"I HAD some neighbors once—clever, good sort of folks. One fall four of them were sick at one time with typhoid fever. The doctor ordered the vinegar barrels whitewashed, and threw about forty cents' worth of carbolic acid into the swill-pail and departed. I went into the kitchen to make gruel. I needed a dish-cloth, and looked about and found several, and such 'rags'! I burned them all and called the daughter of the house to get me a dish-cloth. She looked around on the tables. 'Why,' she said, 'there were about a dozen here this morning;' and she looked in the wood-box and on the mantle-piece, and felt in the dark corner of the cupboard. 'Well,' I said, 'I saw some old, black, rotten rags lying around, and I burned them, for there is death in such dish-cloths as these, and you must never use such again.'

"I took 'turns' at nursing that family for four weeks, and I believe those dirty dish-cloths were the cause of all that hard work. Therefore I say to every housekeeper, keep your dish-cloth clean. You may wear your dresses without ironing, your sun-bonnets without elastics, but you must keep your dish-cloths clean. You may only comb your hair on Sundays; you may not wear a collar unless you go from home; but you must wash your dish-cloth. You may only sweep the floor when the 'sign gets right;' the windows don't need washing; you can look out at the door; that spider-web on the front porch don't hurt anything; but as you love your lives, wash out your dish-cloth. Let the foxtails get ripe in the garden (the seed is a foot deep any way); let the holes in the heels of your husband's stockings go undarned; let the children's shoes go two Sundays without blacking; let two hens sit four weeks on one wooden egg; but do wash your dish-cloths. Eat without a table-cloth; wash your faces and let them dry; do without a curtain for your windows and cake for your tea, but, for heaven's sake, keep your dish-cloths clean." ONE WHO KNOWS.



FIRST FLOOR PLAN OF $4,500 FLATS.

She Wanted a Bracket.

TO BEGIN with she had two vases and a clock. There was no room for them on the bureau, and the table was full. So it happened she wanted a shelf whereon the vases and the clock could be disposed. There was just the place for a shelf between the windows. She measured the space and gave the carpenter an order for a board twelve inches wide, four feet long, and three-fourths of an inch thick. The carpenter offered to put it up with nice iron brackets costing fifty cents a pair, but she said him nay. Such cast iron horrors were inartistic. She would have it all of wood. Had she not a scroll saw? Was she not mistress of hammer and screw-driver? She would make her own bracket for sweet economy's dear sake and her own delight.

Straightway she drew upon paper a design for a sweet thing in brackets. Procuring a piece of clear pine, half inch stuff, she cut out the design upon it with her scroll saw. It was, indeed, a lovely bracket, and she at once made another, polished and sand-papered the pair, and gave them a coat of shellac just for color's sake. She then put a screw through each into the wall and laid the shelf upon them. This is the result: Fig. 1.

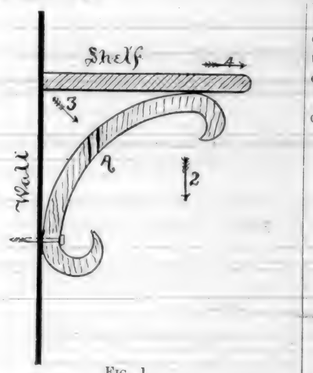


FIG. 1.

The bracket showed a sense of beauty without knowledge. Common sense suggested the placing of the screw at the point shown, near the end of the bracket. Experiment proved that the whole thing was unlovely and inartistic because not founded on the nature of things. The bracket had the beauty of form in a certain bookish way. It was just like the things in the drawing books. It had, also, the inherent beauty of color, because the natural color of the wood had been preserved, yet these things were of no value because the bracket was useless.

She laid the shelf on the brackets, and it at once tipped up, having no support next the wall. She thought this could be remedied by placing a strip of wood under the shelf against the wall. This worked very well, though it did not look quite right. Then she piled a quantity of books on the shelf to see if its factor of safety was within the probable weight of the clock and vases. Both brackets broke off at the point A, and the whole thing was ruined.

At once she went out-of-doors, found a good tree, and sat down to consider the branches thereof. And this is the sum of her consideration: If any one had laid a beam of wood from the main stem of the tree to the branch, say for the purpose of making a support for a swing or for a ladder to gather the fruit, the branch would be essentially a bracket. The beam, like the shelf, would be a lever with the fulcrum at one end. The branch would resist the downward thrust of the lever at the point where it was most needed. So would the bracket—with this difference—the branch resists the thrust in line of its greatest strength or along the grain; the bracket met the thrust in the direction of its weakest point, across the grain. It was also another lever tending to transform the thrust into a transverse strain.

Referring to the bracket, she saw in her mind's eye three strains. First, the tendency of the upper part of the bracket to move outward in the direction of arrow 1. Then there was the thrust downward, arrow 2, due to the weight of the shelf, and lastly there were the two combined that made the breaking strain, shown by arrow 3, in the diagram. Moreover the carved ends of the bracket did not in any way help to support the shelf; they were liable to be broken off, and consequently were inartistic and valueless.

The result of her considerations was a new design for a bracket. Fig. 2.

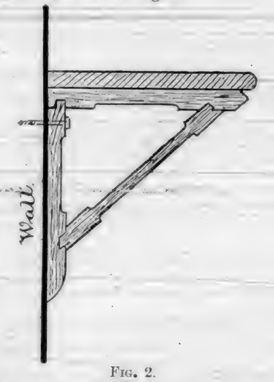


FIG. 2.

At first it appeared painfully stiff and plain. However it worked, so to speak; it could hold up the shelf with ten times the load that would ever be put upon it. Its factor of safety was as ten is to one. Besides this there was only one screw in the wall, and placed where it would be out of sight.

The bracket was composed of three parts, and each, like the branch of the tree, cut out in the line of its greatest strength, or along the grain. The first, or wall piece, was placed upright and had a tenon at the top and a mortise in front near the bottom. This was held to the wall by one screw placed near the top. Why? For two reasons. The tendency of the bracket is to fall under the weight of its load. There is also the tendency to fall outward, because the shelf acts as a lever. If the screw had been put at the lower end of the stick, it would form a pivot on which the bracket would tend to fall outward. By placing the screw at the top it resisted both the downward thrust and the tendency to fall outward.

These things refreshed her mind. It seemed as if she were dealing with the everlasting verities of constructive art. The two remaining members of the bracket had equally important parts to play. The horizontal piece at the top supported the shelf, and, being anchored to the wall-piece by the mortise and tenon, it served as a stay to prevent the bracket from falling outward. It was a tie and resisted the pull of the shelf outward. It was also mortised to the end of the third member, that served to transfer the weight of the end of the shelf to the wall-piece. In this last member the duty is to resist a thrust and to support the shelf by transferring its weight to the wall. This member was also mortised into the wall-piece.

The brackets were a success. Severe in their outline, they still had undeniable beauty. With her knife she cut away the edges in places and made incised ornaments here and there. This took away the square-edge appearance of the work and added a measure of ornament—not much, to be sure, because the whole thing was merely a bracket. It suggested the tree form, the stem and branch. It was fitted to its work and performed it well, because properly designed.

Straightway she placed the vases and the clock on the shelf, and some books and a lamp and other things, and even the baby, when, one day, the nurse upset the bath-tub. Baby sat there for five minutes in mingled comfort and safety, and the bracket did not show signs of distress. Then she considered the thing in a deeper sense.

The bracket was strong, simple, and well designed, and, as a result, artistic. It was truthful, and did not pretend to be what it was not. It might have been turned in a lathe or covered with ornaments, and so long as it preserved the underlying ideas expressed in its present simple form, it would be correct. The moment it departed from these principles it would be inartistic, however ornate, or whatever its material.—*Charles Barnard, in Decorator and Furnisher.*

Safest Way to Use Whisky.

PROCURE any certain quantity of whisky. Into a wide-mouth demijohn, place a quantity of glue; pour the whisky into the demijohn, and put the vessel away for about five days; See that the cork fits tightly. After the expiration of the above time, you will have a superior article of liquid glue, with which broken furniture, etc., can be mended.

Mechanics in Education.

SEEING and feeling are two senses which are more important in aiding to a knowledge of our surroundings than any others, and yet their education is generally neglected until the possessor begins to learn something of mechanics. By mechanics in this connection is intended any attempt to contrive, put together, manufacture or change by manipulation, so that a woman who contrives and fashions a dress out of the unformed and plain material, may be a mechanic. The use of mechanical tools cannot be begun too early in life, whether the pupil is to be a practical mechanic or to follow some other calling—there are few vocations that do not demand for success some practical knowledge of mechanics. "The whittling Yankees" possibly owe much of their undisputed position as inventors and good mechanics to the habit of using a pocket knife. A very prominent inventor and superior mechanic recently remarked that the bent of his taste as a mechanic was undoubtedly given by his schoolmaster, who was a carpenter and joiner, and who worked at his trade in summer and taught the district school in winter. If a boy did not possess a foot rule he made one for him from a shingle or constructed an inch scale. The foot rule and a pocket knife he considered necessary to a schoolboy's outfit, and he encouraged his pupils to estimate dimensions by the eye and then verify them by measurement. Wind mills and water wheels were parts of the pedagogue's training, and the click-clack of one or the other could be heard all about the school-house and on the borders of the brook in an adjoining field. Vanes cut from pine boards, toy ships, bird houses, bows and arrows, pudding sticks, and most of the toys used by boys forty years ago were made by the schoolmaster's boys under his direction. To-day, beside the prolific inventor named, there are one superintendent of a railroad company, one bridge builder, one superintendent of a large manufactory, and two Architects to be counted from memory, who probably received their bent for mechanics from the carpenter schoolmaster.

All these lead lives of usefulness—they are producers, adding to the wealth and comfort of the country and the people; and nothing in their observation education makes them less valuable as members of society. One of the most distinguished orators was a blacksmith, and many men who are noted for their eminence in literature, divinity, law, medicine, and as educators, have had a mechanical training.—*Builder and Wood-Worker.*

Otis Elevators.

SPECIAL attention is called to this elevator now being successfully introduced into general use in this State. The cardinal principle of this elevator is different from that of any other in use, combining strength with simplicity, and more than the usual safeguards against accidents. They are manufactured by John Hammond, 42 Beale Street. Descriptive circulars sent on application.

Not from the Center of the Street.

PREVIOUS to October 1, 1884, it had been the custom with the gas companies to charge consumers for the cost of the service pipe, connecting the mains with the meter, counting the number of feet of such service pipe from the middle of the street. This rule we regard as just and equitable.

Since the above date, however, the companies—now consolidated, to all intents and purposes, into one—have agreed to charge for the actual number of feet of pipe laid, and the rate is made to cover cost of pipe, and an agreed upon cost of labor per foot of pipe laid.

This rule works a hardship upon property owners whose possessions lie on the side farthest away from the main. Take a street 60 feet wide; owners on one side have to pay for 18 feet, and those on the unlucky opposite, 42 feet. At 30 cents a foot, for 1¼ inch pipe, the figures will be $5.40 and $12.60. On wide streets, like Market and Van Ness Avenue, the disparity becomes even more marked.

The gas company claims that the rule now in force is more just to owners, because in the middle-of-the-street rule, they charged a much higher rate than they do under the present system. We do not know by what process of reasoning they arrive at this conclusion, but we do know that there is not a gas fitter in town but who would consider that he had struck a bonanza of the largest proportions if he could get numerous jobs where he could charge 30 cents a foot for 1¼ inch pipe, with as little trouble and expense as the connection of the mains with a meter.

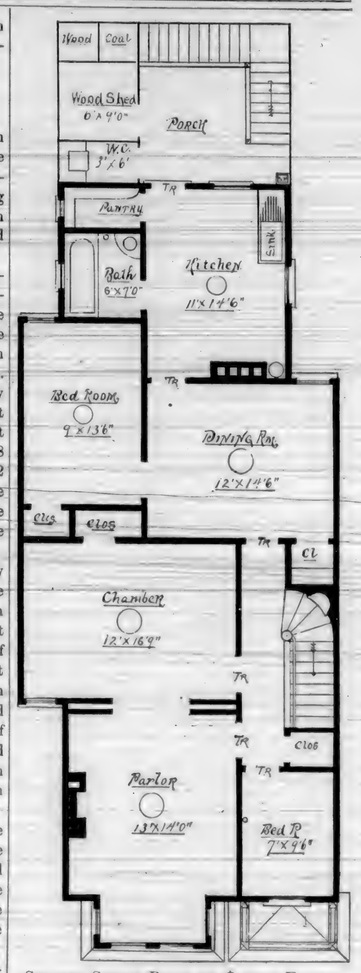
A just rule for the company to observe would be for them to furnish free to the edge of the sidewalk, the pipe and work connected therewith, and then let the owners of the property connect at that point, applying the same stringent test for its security that the law compels to the work inside the house.

When it is taken into consideration, the income derived by the gas company from the consumers of its manufacture, we consider that it should be their aim to reduce the first cost of connection with the mains to a minimum figure. If this policy were carried out, there would be less fault-finding, especially from those who own property on the opposite side of the street from the mains.

Putty.

DON'T you know that if a fire-place fails to draw, it is because your masons filled up the flue; that if the house settles, it's because you failed to use good cement in the foundations; and not because the Architect designed them too small? Don't you know that if sulphate of lime or magnesia blooms out on the face of pressed bricks, it's because your masons failed to do something or other—I don't know just what? And as for the rest of you, take the putty out of your own cracks and own up like men. Don't you plumbers know that scarlet fever and diphtheria were unknown till you and the doctors formed an alliance with the undertakers? Whether your carpenters confess it or not, we Architects know that the only way to keep wood-work from shrinking all to pieces is to catch and kiln-dry the carpenter—poor shrinking thing.

Of course you all do this mischief. Where would we Architects be if you didn't? Why, Architects would have their clients coming into their offices and holding them responsible for defects in their buildings, and then whom would the distressed Architect kick? Thus we discover another use for your putty—to support in the framework of your misdeeds the transparent purity of the flawless Architect.—*Architect John W. Root.*



SECOND STORY PLAN OF $4,500 FLATS.

THE SQUARE AS A FACTOR IN ARCHITECTURE AND GEOMETRY.

Paper Read before the San Francisco Chapter, A. I. A., by John Gash.

MR. PRESIDENT AND GENTLEMEN: I have taken for my papers to read before you this evening, the "Square as a Factor in Architecture and Geometry." That the square with the triangle and circle, form, as it were, the basis from which almost all other geometrical figures are formed, we are all of us aware, nor is it to be wondered at that the circle and triangle should form the basis from which the early architects should draw their outlines and figures as nature set the example, the earth, the sun, with the trees of the forest, all having the circle for their bases. The starry firmament have the triangle, but nowhere do we find the square except in the human form, where a man's arms, extended from tip to tip of his fingers, are equal to his height. The birds have taken the circle for the universal form of their houses, and the bee has adopted the hexagon. To man, then, alone, do we look for the square in his designs for buildings. Why it should be remains so far to the world a mystery.

While the ruthless hand of time has destroyed all chains of past ages to show that mankind in different countries had a sort of affiliation with one another, nothing is left to establish this fact but architecture. How happy should those feel who do their part to continue that chain that was first forged by Tubal Cain, and ever since continued to the present day, despite war, famine, pestilence, and the ever-changing destinies of nation—to you, my brothers, is this handed down. I trust you will pass it along, so that when you are laid in the silent dust, and perchance no mention made of your name, the architects of future generations may look with pride at those who lived in the nineteenth century. History fails to tell us that Greece, Rome, Egypt, Persia, India, China, Babylon, Mexico, the Aztec nation, England, Italy, Peru, were all at some remote period known to one another. The architecture of those countries alone establishes the fact, and the most particular part of that which each of the above countries have adopted, is the square. I will briefly refer to a few of the buildings to be found in those countries which I refer to, that have taken it for a basis. The Jewish people of Palestine, and the Druids of England, have given us the square and circle as the basis of their architecture in the buildings erected to their form of worship, the temple of Jerusalem erected by King Solomon, and the house of the forest of Lebanon by the former, and the stone henge by the latter.

Beginning with Greece we find that, as a rule, her temples were built in the form of a double square, the length being equal to twice the breadth.

The temple of Juno, erected at Samos about 540 B. C., the Temple of Jupitor at Selinus, the Temple of Jupiter Olympus in Sicily, and the Parthenon of Athens are each and all built on the principle of the double square.

Leaving Greece and entering her rival sister, Rome, we find her religious and public buildings partaking of the quadrangular shape, nor is this to be wondered at, as many of them were erected under Grecian Architects, who found Rome a more remunerative field for their labor, more especially after Greece became a Roman province, about 145 years before the Christian era.

The square is most noticeably used in the Roman pantheon, its entire height being equal to its width, and, though being circular in plan in the details of the interior, the *square* is very much used, more especially in the paneling of its vaulted ceiling. In the Temple of Peace, also the Temple of Concord, the Roman Forum, the Temple of Jupitor Stator, the Palace of Diocleccan, at Spalatro, all have the square for a basis, and somewhat singular in the Temple of the Sibyl at Tivoli, which is of circular form, with, perhaps, the best example of the Corinthian columns to be found in any Roman temple of its time. The opening for doors and windows are two squares, their height being twice their width, a system adopted long afterward by the immortal Angelo, but somewhat slightly discarded in the nineteenth century. The Temple of Balbac, erected by the worshipers of the sun, being, perhaps, one of the most stupendous pieces of architecture ever erected to the "god of the day," assembled within its walls to hail that majestic circular orb, as he rose in his majesty above the eastern horizon, adopted the square for the outline of the shrine in which they should hail his first appearance and gaze on him as he traversed the vaulted canopy of heaven. Why this should be can only be conjectured because of the close relation that exists between that circular orb and the square.

The first traveler who describes this temple with accuracy is Maundrell, in his journey from Alepo to Jerusalem in 1697. The principal building, the temple, is of a rectangular form, being 3,600 feet long by 350 wide, with a portico 200 feet long by 100 wide, being *two* squares in length to one in breadth.

Perhaps, before referring to the architecture of Greece and Rome, I should have referred to that of Egypt, as this country, which may justly claim to be the *parent* of geometry, the fundamental principles of architecture, uniformity of plan characterizing all their work, never deviated from the right line and square. Their pyramids became the history of an age long past, telling of those wonderful structures referred to by Herodotus, Strabo, Plutarch and others. From these we learn that the great pyramids of Chrops were 800 feet square, running to a height of some 852 feet.

It would, indeed, be doing an injustice to attempt to give you any description of those pyramids in these papers, as that would make a complete subject in itself, which, I trust, some of you may read papers on at some future meeting. But my object was to show how the square was used as a factor in early architecture, and how, especially so, in the pyramids—nor was it less so in her temples, as we may see in those near Thebes, Carnac, and Luxor. The tomb of Osymandy, as we find, according to Diodorus, was a peristyleum 400 feet square, supported by animals 16 cubits high, each in one stone. As Egypt was, without a doubt, the parent of geometry, and the square, a natural outgrowth of the circle, in fact a reasonable consequence resulting from inclosing the circle by four lines, as well as *three*, the outgrowth of the triangle, which was held as a sacred figure by the Egyptians, it may reasonably be supposed that it would be adopted as a basis for their temples and tombs, and hence may be adopted by people who may have emigrated to other parts. Hence, we find in Persia, more especially in Persipolus, the same style and details in architecture as is to be found in Egypt. In the city of Ispahan, when visited by Chardin, in 1666, he describes their houses as being built with large square courts, surrounded with rooms of various dimensions, the sides of the area being planted with flowers and refreshed with fountains similar to the buildings to be found in Mexico at the present day.

Traveling into India we find history lost in trying to discover whence she derived her architecture; until within a late period it was supposed it was from Egypt. Sir William Jones, whose opinion seems to have been that the Indian temples and edifices are not of the highest antiquity, says that they prove an early antiquity, between India and Africa; that the structures of the early temples were pyramidal and partook of the form of a square, may be seen at Duogur and near Tanpore. There is also a pagoda of great antiquity near Posto Novo, on the Carromandel Coast, having within it a square court with a temple and pescina, to which is given the name of the Stream of Eternal Joy. There is also a temple of extraordinary size on the small Island of Scringham; it is composed of seven square inclosures, one within the other, the walls of which are 25 feet high and 4 feet thick. These inclosures are 350 feet distant from one another, making the outer walls nearly four miles in length, when we trace the square in general design of those Indian temples, whose antiquity history fails to describe. Leaving India we pass into China, whose history is buried as deep as that of India or Egypt. We find her architecture has certain features that make, as it were, a connection between her and those other countries I refer to, perhaps the most noticeable being the square.

The imitation of the tent is the true origin of their building, so that, from the accounts of travelers, a Chinese city looks like a large permanent encampment, as well in respect to its roof as its extent.

Yet while these are mostly of a circular form, the palaces and temples are built quadrangular, like the palace at Pekin, measuring

3,600 feet from east to west, by 3,000 feet from north to south. There is the pagoda, or Temple Ho-nany, measuring 590 feet long by 250 wide, and having with it buildings at its angles 30 feet square, and three pavilions 33 feet square; but perhaps the Great Wall of China is one of its most remarkable monuments, having towers on it at intervals of 200 paces measuring 40 feet square at the base, diminishing to 30 feet square at the top.

Leaving the Orient, feeling satisfied that the square, as a factor, was most usually adopted as the basis of their architectural monuments, we would take a passing glance at an equally ancient country, whose buildings are as great a mystery as those of Asia or Africa. While Prescott, in his history of Mexico, tries to describe its people, yet the antiquity of its architecture is lost in the sands of time, and its fundamental principles can only be traced in the use of the square in the general plan of its temples.

The edifices erected by the first inhabitants of Mexico for religious purposes were solid masses of earth of a pyramidal shape partly faced with stone. The great Pyramid of Cholula, the largest and most sacred temple in Mexico, appears at a distance like a natural conical hill wooded and crowned with a small church. Humboldt compares it to a square whose base is four times that of the place Vendome, in Paris, covered with brick to a height of twice that of the Louvre, the length of each side of its square base being 1,423 feet, and the height 177 feet.

In the northern part of Vera Cruz is found a pyramid of great antiquity measuring 80 feet square at the base, and nearly 60 feet high. The Tombs of Mitla are three edifices placed symmetrically in a very romantic situation. The number of separate buildings was originally five, and they were disposed with great regularity, having within them a court measuring 150 feet square. In Sonora, in the Gulf of California, on the banks of the Rio Gila, are some remarkable ruins known by the name of the Casa Grande, showing the remains of an ancient Aztec city, having many distinctive Egyptian architectural features, being quadrangular, with their sides facing the four cardinal points. From these we must conclude that the people had no means of modeling their ideas through study of the existing monuments of other nations, nor of preserving any traces of the style of building practiced by the race from which they originated.

It must be reasonably supposed that the vicinity of the continents of Asia and America is such that the arts and improvements must have been carried from one continent to the other. Having shown from a cursorary glance through the countries which I have above referred to, how the square formed a sort of connecting link in the several temples and monuments erected by each, though widely separated by time and distance, I will now occupy your time a little while in showing how it became a factor after the dawn of the Christian era in Europe. The cross, the emblem of Christianity, being taken as a basis for temples of worship erected to the founder of the Christian dispensation, buildings were erected after the style of the Latin and Greek cross, the former being six squares, the sides of a cube, giving one for the sanctuary, one for each transept, and three for the body or nave of the church, the Greek cross being five squares, one for each arm and one for the body of the building, both of these forming the basis of the several European cathedrals of the thirteenth, fourteenth, and fifteenth centuries, being lengthened in the nave more especially, as in the Cathedrals of Worms, the Church of Santa Maria Del Fiora vi Florence and several others.

Perhaps the best specimen of a church after the Greek cross is the church of St. Geneviere, in Paris, or, as it has since been called, the Pantheon, erected by Louis XV. But in all these the square has been uniformly followed by their Architects, not only in the general plan, but in their interior details, in their doors and windows, most conspicuously the quarter-foil, which, with the trefoil, was a characteristic feature of the early English style in church architecture, as also in the domestic architecture of Louis XIV. of France.

I have thus far shown you what a factor the square has been in architecture to form as if a continuous link in the great chain of our profession from the remotest period; while the work of the historian, the theologian, the scientist, has been lost in the sands of time, to the Architect alone has it been given the talisman that tells how past ages and nations must have intermingled with each other before the railroad, the telegraph, or telephone were even thought of.

In geometry it has of itself stood equally as conspicuous and alone as in architecture, never affiliating with its sister figures, the circle and triangle, save that, in the case of the circle, it condescends to admit of its four sides becoming a tangent to the circle when inscribed within it, and touching the circumference at its four angles when circumscribed round it. No nearer has any mathematician thus far been able to show what relationship one has to the other in point of area, though both may have the same diameter. The squaring of the circle has been an unsolved problem thus far, nor was any relationship in point of area found between itself and the triangle until Pythagoras found that a square described on its diagonal (which cut into two triangles) was equal to the sum of the square described on its other two sides.

It admits of being subdivided in itself without the aid of any other figure in geometry, and even then cuts up some funny pranks that were equally as mysterious as itself; thus, for instance, cutting a side into two equal parts the square of the whole line is four times the square of its half; cutting it into two uneven parts, the square of the whole line is equal to the sum of the square of the two parts and double the products of the parts. Again, dividing the side of a square into two uneven parts, the difference between the square of the two parts is equal to the product of the sum and difference of the parts. Thus you see the square is a mystery in itself; perhaps this is more especially the reason why man is said to act on the square with his fellow-man, being separate from all other beings or figures, and a mystery with himself; however this may be to us, as a Chapter of Architects, it has been transmitted, with its sides equal and angles true. Trusting we may so transmit it to future generations in our works and lives, I thank you for the attention you have given me on the square.

An experienced foreman, who has an eye for philosophy, says that tools apparently partake of the temper of those who use them. A short-grained man has nicked bits; the impetuous man, broken ones; the lazy man, dull ones; the careless man, badly dressed ones; the man with one idea, one dress for all kinds of work; the soft man can rarely keep the edge of a tool from turning, while the good-natured and even-tempered man has the best tools in the shop, and is pestered continually by ill-tempered workmen who come to borrow from him whenever they have a particular piece of work to do. It is quite interesting to note the similarity in the temper of workmen and their tools.

C. H. M. asks why a person will take cold quicker lying down on a bed than if sitting up—yet when they get into or go to bed, they are warmer than while sitting up.

Answer—If you are correct in your statement, it is probably because more vital energy is put forth by people who are not lying down, and in bed one is generally protected by additional clothing.

A Band saw for cutting marble is described in *Le Genie Civil*, which certainly merits mention. Every one knows that the saws ordinarily used for cutting marble or hard stone, which consist of plain steel blades, fed with sand, lose much of their efficiency by the filling of the cut with a paste of finely ground sand and stone, so there is a certain advantage in working with a vertical saw which does not accumulate pulverized stone beneath it. The difficulty in employing a toothed saw-blade lies, however, in the rapid wearing of the teeth, by which the blade is soon reduced to a smooth ribbon of steel. To prevent this, the new saw is provided with an accessory in the shape of a grooved wheel of hardened steel, which is set at right angles with the saw-blade, and engages with the teeth of the saw. This grooved wh el is made to press so firmly against the blade as to notch it, thereby reviving the teeth as fast as they are worn down. The teeth are of course rather rudely formed, and are left with a large "burr," but this seems to help the cutting action, by making more room for the blade in the cut. In practice this saw is operated at a very high velocity; and although we have no statement of its efficiency, it seems quite possible that it will be useful.