

THE BASILICA OF ST. PETER'S, ROME.

No one ever viewed the interior of the great Cathedral of St. Peter's in Rome otherwise than with a feeling of disappointment. At this first sight begins that series of ocular deceptions which pursue one throughout the vast edifice. The illusion is sedulously enhanced by the architectural construction. The size of objects that are at a distance above the eye is clearly increased in far more than may be called the just proportion of their remoteness; where the vault of the nave springs from the sidepiers, the upward lines are broken by a heavy cornice and by a broad transverse architrave; and further to baffle and expel all possibility of continuity with the marbled and fluted pilasters, the ceiling is composed of small richly gilded panels. In fact, without entering into further details of the interior, the whole illusive architectural effect depends on every line, whether straight or curved, being broken at every available point, on exaggerated dimensions of remote objects, and on the wonderful finish even of the minutest details.

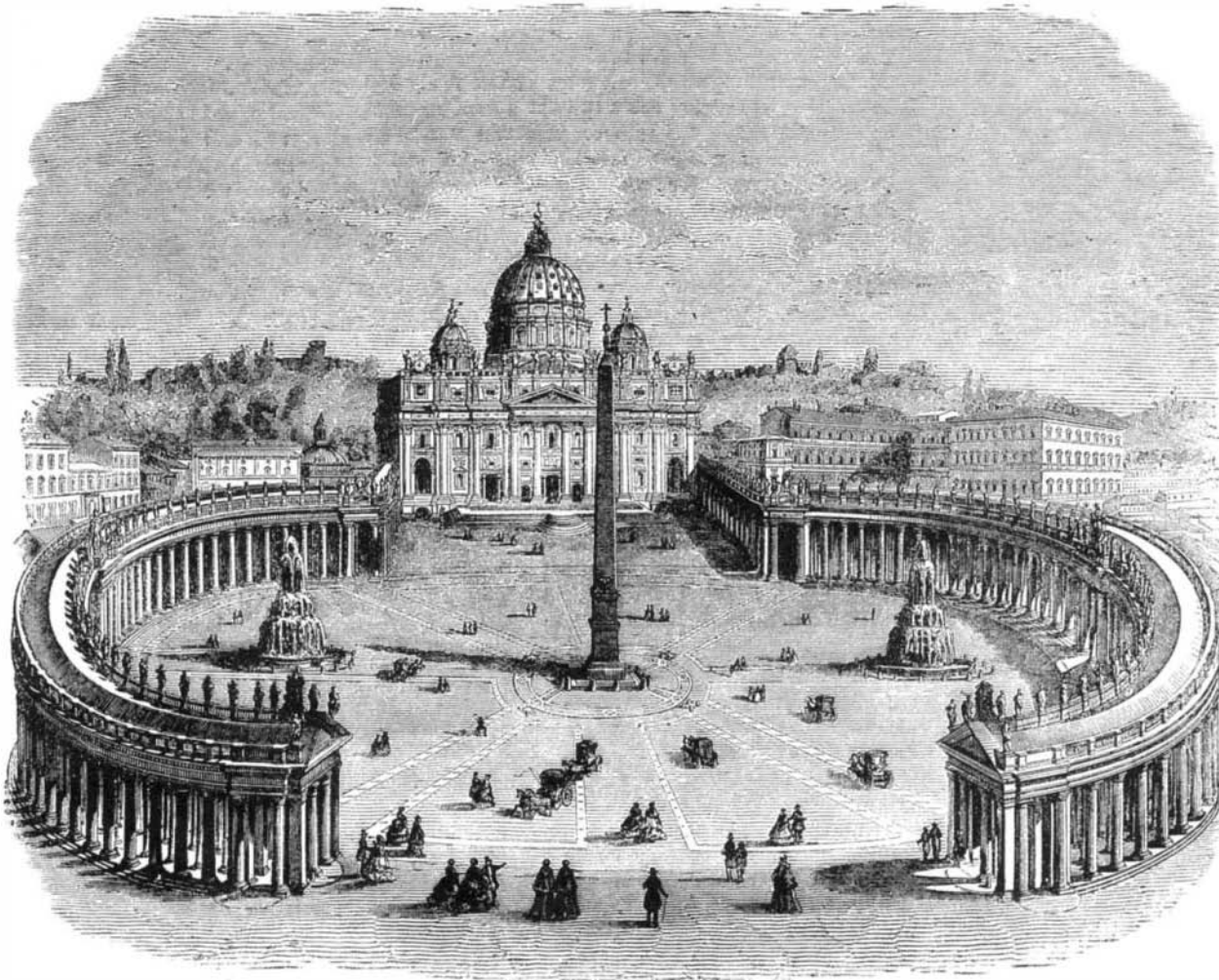
With this brief reference to the optical puzzle of the interior, we may turn to some other wonders of the great structure. It was three centuries and a half in building, it was superintended by forty-three popes, and its cost was \$49,840,000.

The shape of the church is that of a Greek cross 720 feet long, 510 feet broad, and about 500 feet high to the summit of the cross over the dome. The dome is double, and was thus constructed as an expedient to satisfy views from within and without. Looking up from within, were there but

the outer dome, the proportion would be bad; similarly, viewing from without, were the dome reduced to suit the interior aspect, the effect would again be disproportionate. Hence the two domes, one covering the other, and the outer one 159 feet high above the roof.

mediate space between the outer and inner domes, the visitor traverses a gradually narrowing and winding staircase until finally he emerges in the golden ball below the cross. Here sixteen persons may find room; and from the loopholes there is a view, of broad Campagna, and sea, and purple mountains,

such as none but poets can describe. Within, Saint Peter's is finished in exquisite marbles, and in the mosaics for which Roman artificers are famous. Outside, gigantic statues abound. There are 192 figures, each twelve feet high, over the porch alone. On the Piazza are two equestrian figures of Constantine and Charlemagne, and in the center is the famous obelisk brought from Egypt. It was in the erection of this stone that a great engineering blunder was brought to a successful result by a timely thought of a bystander. There was a great crowd on the Piazza, watching the slow ascent of the stone as it gradually was lifted to its place. Suddenly its movement stopped. Somebody had miscalculated, the ropes had stretched, and there the great mass hung within an inch or so of its destination. It was impossible to move it further with the apparatus at hand. The engineers were despairing, when a sailor amid the crowd shouted: "Wet the ropes!" This was at once done, the cables contracted, and Nature lifted the stone the

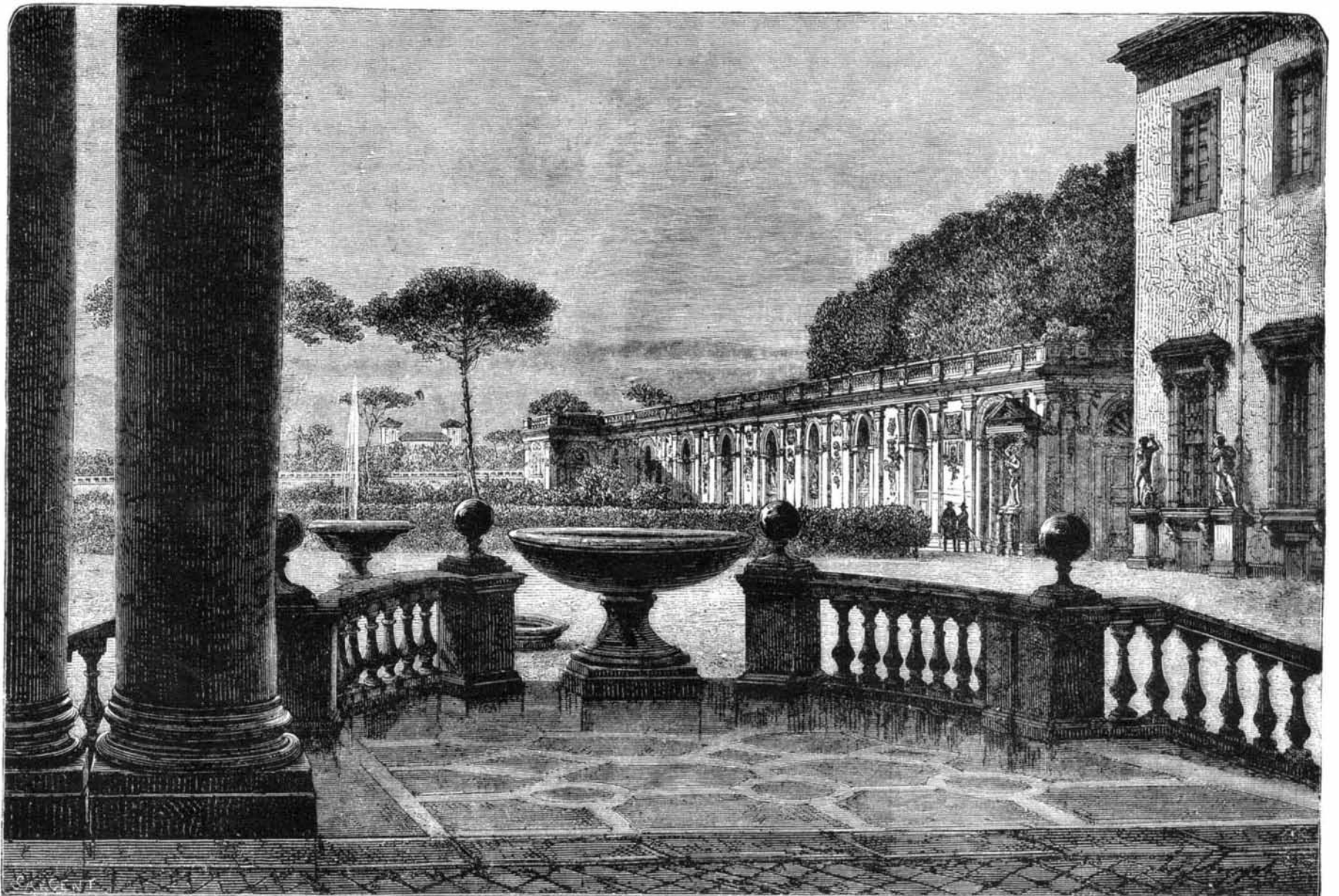


ST. PETER'S AND THE VATICAN, ROME.

To ascend to the roof is like visiting an aerial village. The high parapets conceal all view of the Roman streets below; while at every hand are the dwellings of workmen who are constantly repairing the stonework. From the midst of the small houses rises the vast dome, larger than an ordinary church; for it is 405 feet in diameter. Entering the inter-

rest of the way.

Our second engraving represents the villa and garden of the famous Medici family of Rome, remarkable for the magnificent statues with which the grounds are adorned, and the many art treasures of its interior. It is now occupied by the French Academy of art students.



GARDENS OF THE VILLA MEDICI, ROME.

Finishing Lace and other Fabrics.

A correspondent having asked us several questions on this subject, we have pleasure in stating that cotton lace, after going through the processes of gassing, or the passing it with the requisite velocity over flames, so as to remove the slight exterior fibres, has acquired a much darker color than is natural; but bleaching restores the article to a perfect whiteness. A piece is often returned soundly bleached within twenty-four hours after delivery. In Nottingham we have seen a machine by which, instead of being wrung or pressed and hung up in a hot room to dry, as is the mode, the article was wrapped round in a kind of coil between two copper cylinders, the outer one of which is perforated with holes. The apparatus is made to rotate perhaps a thousand times in a minute, so that by the centrifugal force thus obtained the damp is quickly driven off. The dressing of lace, so as fully to extend the meshes to their proper shape, and by stiffening the fabric prevent its collapse, is a most important operation, and of course requires care and experience on the part of the class known as dressers, of whom there are almost forty having extensive premises in or near Nottingham. It is performed, first, by passing the bleached or dyed and purified lace through a hot mixture of gum and starch and other materials, and then submitting the lace to the action of revolving cylinders, which squeeze out the surplus stiffening fluid. Next, the piece, in a wet and heavy mass, is taken to the stretching room, which extends from 40 to 120 yards in length, and is wide enough usually to allow of two frames being placed at a sufficient distance to be worked side by side. The heat required is seldom under eighty degrees, and often much more. By means of the side of the frame receding, the lace is gradually extended to its full width; the utmost care being taken not to disturb the mesh either in length or width. On this point will absolutely depend the quality and salable value of the article. Attention has to be paid to the amount of dress in regard to stiffness and weight for single, double, treble, or even quadruple stiffness; and also as to color, clearness, crispness, and elasticity, on which particulars, together with the peculiar ingredients used, depended the preference so long given French over English dressing of plain black silk. Then, to secure freedom from small blotches of stiffening and impurities clinging to the meshes, the pieces are lightly and carefully rubbed with flannels to equalize the stiffening, and then beaten by switches and rods as they are distending; and to promote rapid drying, and consequent clean face and elasticity in hand of the dressed article, the piece, when fully dressed, is fanned with broad, spade-like implements, which produce powerful currents of air. When finished, each is carefully rolled up and folded, preparatory to its being sent to the finishing warehouse, where, the selvages having been placed exactly even in rolling off the dressing frame, it will, if a wide, plain piece, be cut off, without unrolling, into suitable widths for sale.

The business in chemicals and dyestuffs for bleachers and dyers, in starch, gum, and other materials used for dressing, has necessarily become very large. A piece of cotton net weighing, in an unbleached state, 15 lbs., will increase in proportion to the dress required, so that, if "Paris" dressed it will become 60 lbs. weight, and the edges will cut through the skin like a saw. All nets for foundations of articles of female attire are thus weighted and stiffened. They have been in large request as foundations for bonnets and similar purposes, but are subject to the fluctuations of fashion, or the rise of the materials used, and consequent advances in price, which may lessen or destroy consumption. The mere disuse of a trifling attachment to bonnets lowered the returns of one lace-finishing house some tens of thousands of pounds in one year.—*Textile Manufacturer.*

The Mediterranean Coast of France.

A contemporary, speaking of the geological changes which have taken place in parts of Southern France since the time of the Romans, says: "The French shore of the Mediterranean divides into two distinct parts, which offer a strange contrast to each other. From Genoa to Marseilles all is life and beauty; all the world goes there for pleasure or health. From Marseilles to the coast of Spain, one finds everywhere solitude and desolation. The latter region was at one time highly prosperous, but it has been entirely changed by the immense quantities of sand and mud brought down by the rivers. Narbonne, in the time of the Romans, communicated directly with the sea. It had its lagoon, like Venice, and a deep canal afforded passage to heavy merchant ships and the triremes of the Imperial fleet. The lagoon is now blocked up, and the commerce, wealth, and activity are all gone. Arles was another very important city; it had two ports, like Alexandria, and was so rich and powerful that a poet of the fourth century spoke of it as the Rome of the Gauls. The Rhone, with its annual 22,236,000 cubic yards of sediments, has been its ruin. So with other cities; but while they have become separated from the sea, agriculture is gradually taking possession of the land won from the water, and the vine and olive may yet restore a part of the ancient prosperity."

Winter Dressing Fruit Trees.

Even a tyro in gardening, says a correspondent to the *Journal of Horticulture* knows that the brown or peach aphid is active upon the shoots of the peach and nectarine during the winter as the summer months; that brown scale remains through the winter upon shoots which it has obtained a footing upon during the summer; that mussel scale holds tena-

ciously to the bark of apple and pear trees; that mealy bug and spider, when plants they infest become leafless, seek out the rough parts of the bark, beneath which they creep, shielded alike from cold and wet; that the whole tribe of aphides is more or less active during the winter months; and that the thrips are not more given to pass the winter in obscurity than slugs. Against such insects the following recipes will be found useful: Soft soap half a pound, to which add a wineglassful of spirits of turpentine, and with a stick mixing thoroughly with the soft soap, having ready boiling tobacco juice, and adding this a little at a time, so as to incorporate the whole, the tobacco juice that is to be added being a half a gallon. This small quantity will suffice to dress a dozen vines or four average sized peach trees. Apply the mixture with a brush to every part of the trees, after it becomes cooled to 120°, taking care to brush it into the angles and crevices of the bark, and not to injure the eyes or dislocate the buds, which, however, should be coated with the stuff. The sooner it is applied after the leaves have fallen the better, as the pests remain as long as possible before retiring for the winter. The mixture is only applicable to ligneous plants, and to those only when at rest.

For destroying white or brown scale and mealy bug upon growing plants, mix 8 ozs. of soft soap with a wineglassful of spirits of turpentine, adding gradually half a gallon of boiling water, stirring so as to thoroughly incorporate. Apply with a brush to the parts infected, or with sponge to leaves, at a temperature not exceeding 120°. The plants must be syringed with water immediately after they have been dressed with the solution, taking care not to allow the mixture to run down the stems in full strength to the roots.

The Manufacture of Milk Sugar.

A. Sauter, in a communication to the *Schweizerische Wochenschrift für Pharmacie*, gives an account of a visit to Marbach, in the canton of Luzern, Switzerland, where half a dozen refiners are said to make a handsome income from the manufacture of milk sugar.

The raw material used for the recrystallization comes from the neighboring Alps, in the cantons of Luzern, Berne, Schwyz, etc.; a considerable quantity is supplied also by Gruyères. It is the so-called *Schottensand* or *Zuckersand*, the French *déchet de lait*, obtained by simple evaporation of the whey after cheese making. Notwithstanding a continual rise in the price, consequent upon the demand and the increased cost of labor and fuel, the manufacture continually expands, and now amounts to 1,800 to 2,000 cwts. yearly, corresponding to a gross value of about \$60,000, certainly a handsome sum for a small mountain village with but few inhabitants.

The manufacture is only carried on in the higher mountains, because there the material can no longer be used profitably for the fattening of swine, which are found chiefly in the valleys; and the wood required for the evaporating process is cheaper in the highlands.

The crude material is sent to the manufacturer, or refiner, in sacks containing one or two hundredweights. It is washed in copper vessels, and dissolved to saturation at the boiling temperature over a fire; and the yellow brown liquor, after straining, is allowed to stand in copper-lined tubs or long troughs to crystallize. The sugar crystals form in clusters on immersed chips of wood, and these are the most pure, and therefore of rather greater commercial value than the milk sugar in plates which is deposited on the sides of the vessels.

In ten to fourteen days the process of crystallization has ended, and the milk sugar has finished growing. The crystals are then washed with cold water, afterwards dried in a cauldron over a fire, and packed in casks holding four to five hundredweights.

As the *Schottensand* can only be obtained in the summer, the recrystallization is not carried on in the winter, hence a popular saying that the milk sugar does not grow in the winter. The entire manipulation is carried on in a very primitive manner, it being a matter of astonishment to find a specific gravity instrument in any place. The author is of opinion that with a more rational method of working a whiter and finer quality of sugar could be produced.

Effect of Heat on Carriage Woodwork at the Centennial.

The *Carriage Monthly*, a most excellent publication, calls attention to the failure of many of the foreign carriages exhibited at the Centennial to withstand the excessive heat of last summer. Our contemporary states that, after careful examination, it found a large number of carriages in which not only the grain showed, but in which the work generally exhibited signs of shrinkage and coming to pieces. Panels were checked and shrunk, joints opened, parts had warped out of square, spokes were loose, and in fact the vehicles seemed to need prompt relegation to the shop and a thorough overhauling.

On the other hand, it is gratifying to learn that these deficiencies were confined to foreign carriages, and that the wagons of American make withstood the trial perfectly. One *coupe* was exhibited destitute of paint or priming, and yet, after the six months' subjection to heat and damp, every joint was solid and firm. The journal we quote from, which, it should be remembered, is published in the interest of our carriage manufacturers, and therefore its statements may be taken with a grain of allowance, adds: "The Americans have gained a well earned victory over European makers, both in quality of stock and in workmanship, and we shall not be surprised to see orders in large numbers received for

American carriages, to be shipped to all parts of the world; also an increased demand for American woods, which enter into the construction of bodies, wheels, and gears. The American poplar and basswood are superior to the mahogany and cedar used by the French and English for panels, while our wheel stock is acknowledged by all to be the only timber suitable for wear and lasting qualities."

Kaolin.

Kaolin, or china clay, is a product of the decomposition of granite, and in its preparation for commerce has to be separated from the other constituents—quartz and mica. If this occurs on a hill side, slopes will be cut in the hill, and a stream of water will be made to flow over the face of the slope. The water, aided by a little work with a broad pick, breaks down the clay, and carries forward the kaolin and the mica, but very soon drops the quartz or gravel. This gravel is partly thrown away, partly used for the floor of the evaporating pans to be referred to. The great point is to do as much work as possible with water, and to save manual labor. The water then passes into a number of small pits, where it is brought almost to stagnation; and as it passes slowly along backwards and forwards it deposits the mica, and is then taken into the collecting pit. From this it is allowed to run into a number of evaporating pans, where it is left slowly to evaporate, leaving behind a deposit of pure white kaolin, free from silica and mica. When the sediment in these pits has accumulated to a depth of 8 or 10 inches, it is dug out before it hardens, and is then the china clay of commerce. For the purpose of expelling a great deal of the water, it is placed under sheds in the dry season, and in later years it has been dried artificially by means of heated pipes. The selling price is only from \$5.00 to \$10.00 per ton, yet under favorable circumstances, plenty of water, etc., it can be manufactured at such a rate as to be very profitable.—*Professor Smyth.*

The Man of Business and the Business Man.

The man of business and the business man both have business to do; but the business man is the one who does it. The business man thinks, moves, acts, and makes himself felt in the world. If a thought comes into his head, it is one of breadth and compass—it does not center on self and its narrow world. It reaches away and embraces others. It has a wide range, and does not stop till it touches and affects for good the interests of all. Nor are the thoughts of such men immobile. They become acting, living realities in the wide and busy world. The authors of them make of these business thoughts actualities, give them "local habitation and a name," and steamboats are built, and ocean is navigated, and distant climes and nations brought together; an electric telegraph springs into being as by enchantment, and lightning becomes garrulous and voluble, and thought out-travels the winged winds; and in a twinkling the bands and shackles of trade are loosened. Such are the workings produced by the business man. He awakens the drowsy and helpless multitudes, puts life and thought, energy and action, into them, and makes the world leap rejoicing along the path of ages. Where its step before was but a single year, now it strides by scores and fifties.

"Men of thought, men of action,
Clear the way."

And they do clear the way—their thoughts become tangible, moving, demolishing forces, that break down and crush all opposing barriers, opening a pathway of progress, into which the more sluggish and timid portion of humanity may securely travel.

But the man of business is emphatically what the name indicates. His business is always on his hands. He does not do it. He does not know how to go to work in the right way. His thoughts are all measured and slow. He weighs self-made doubts and supposed contingencies, and before he moves the business man gets up and runs away from him and wins the race. The man of business won't go ahead, he only eddies round and round—he does not progress—his path is a circle. He does not find himself at night many miles on his journey's way, but, like the hour hand of a clock, just where he started. He is not clear and decided in what he does, but often stands hesitating and puzzled. He ventures and falls back: has a stout heart in fancy, but none in fact.

A New Source of Illumination.

Between Bordeaux and Bayonne, in France, there is a large stretch of sandy desert, whereon there is little vegetation save here and there patches of pine trees. From these trees there runs a resinous matter, which is collected and sold by the inhabitants of the region. This substance has recently been studied by M. Guillemare, and he now announces, to the French Academy of Sciences, that he has produced three kinds of oil from the material, all rich in carbon containing respectively 80, 90 and 92 per cent. of that element. The light yielded on burning the oils is remarkable for its whiteness and steadiness and is said to be suitable for lighthouse illumination and even for photography.

Whitewash your Shops.

An exchange offers the very sensible suggestion that a little water applied to factory windows, and some of the same liquid mixed with lime and applied to walls and ceilings, will not cost much: while at the same time, during these murky winter days, it will render workshops lighter, conduce to the health and comfort of operatives, and perhaps save some gas bills.