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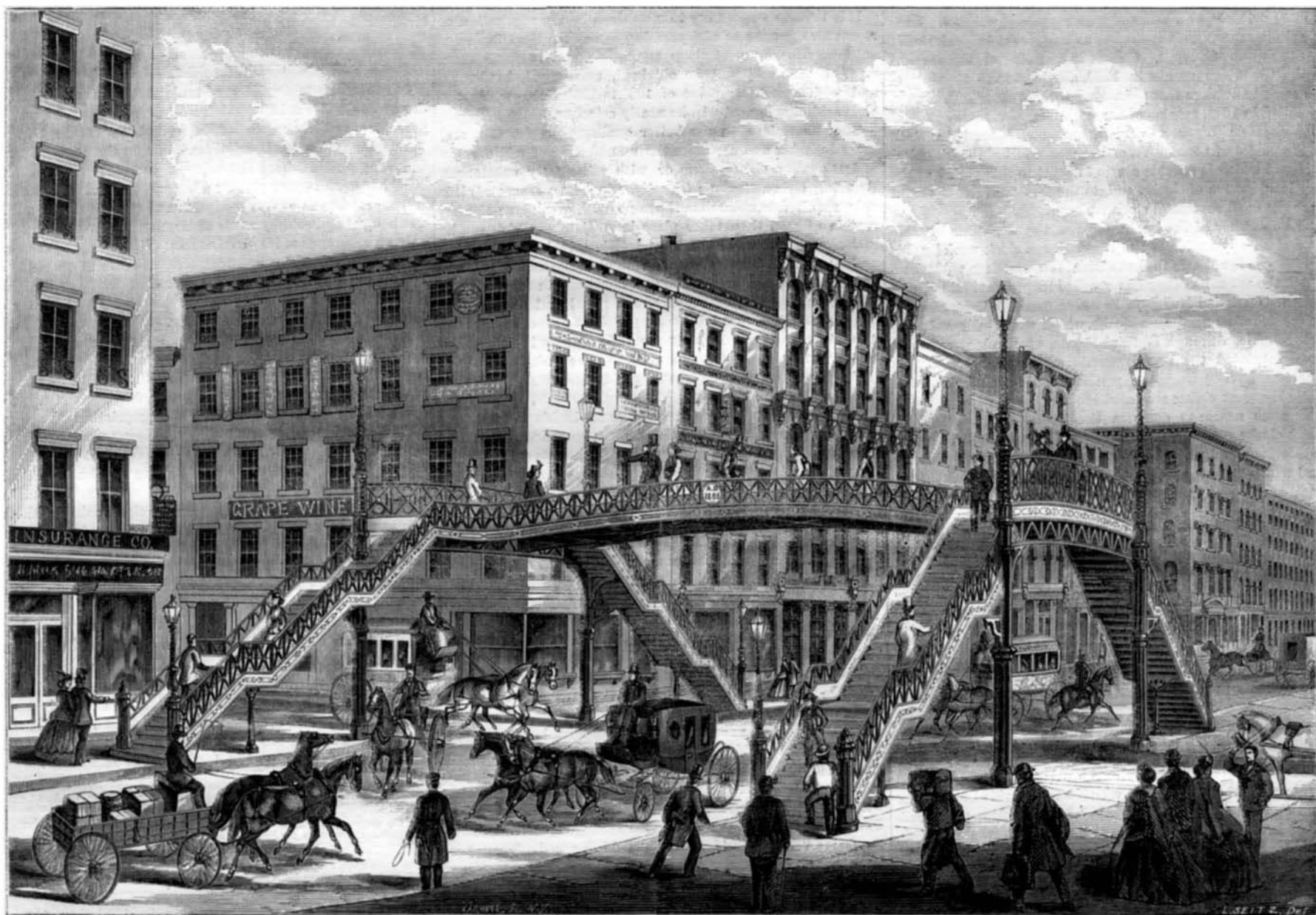
## Foot Bridge across Broadway.

Not only the inhabitants of the metropolis but the people of the country—the thousands of strangers who daily crowd our streets—will rejoice at any attempt to relieve the jam which appears to be now the normal condition of some of our streets, especially Broadway. It is no uncommon thing that pedestrians, desiring to cross Broadway in the vicinity of Fulton street, are compelled to go down below Trinity Church before they can get an opportunity to do so. The corps of po-

will rest on rollers to provide for contraction and expansion. The steps of the stairs will be of oak, as well as the deck of the bridge, which will be calked to make it water tight.

Ritch & Griffiths, Architects, 153 Broadway, are the designers and contractors. The contract price was \$15,000, but the builders state the actual cost at \$22,000. When located, which is expected by the 1st of March, it will be an ornament to the street as well as a convenience to the people. The work of laying the foundations of the end columns is

ing Palliser shot are also in course of manufacture at the above works, to the orders of the British Government. They are made of soft gray cast-iron and have a pair of trunnions cast on them, so that they have the appearance of small mortars. The trunnions are carefully turned, and then made use of for fixing the chill to the face-plate of the lathe in temporary bearings for boring. The pointed bottom of the bore, corresponding to the nose of the Palliser shot, is finished with a tool carefully ground to a template from a flat piece of steel, this



THE BROADWAY BRIDGE FOR PEDESTRIANS.

licemen, always ready to assist the young, old, and the weak-er sex, are insufficient to reduce the annoyance to a minimum.

We present, herewith, a fine engraving of the proposed bridge across Broadway, from Fulton street east, to Fulton street west. The view is taken from the corner of Fulton, at St. Paul's Church, looking down Broadway. The artist has introduced a large number of figures to suggest the crowded state of the street, but the engraving does not do justice to the vehicular and pedestrian crowd which, day after day from early morning to night fall, surge and push through the main thoroughfare.

The bridge is of iron—wrought and cast—elevated 17 feet 8 inches over Broadway. The length of the bridge is 57 feet at Knox's corner, and 54 feet at the other; the width is 14 feet. The bridge has two longitudinal beams, a combination of wrought and cast iron, one a flange and the other a lattice, each calculated for 46 tons breaking weight; but on trial the bridge is found capable of sustaining 101 tons, one-third of which is the permanent weight of the bridge. As set up in the yard, 100 men passed over it at one time producing no perceptible vibration. Loaded with 50 tons, the depression was less than three-eighths of an inch. The bridge is reached by four flights of steps, each 19 feet high, five feet wide, having to each flight three landings, the steps of each numbering 34. Both the lattice work of the stairways and of the bridge proper are lined with sheet iron to a height of three feet; the intersections of the lattices being ornamented with rosettes. Four iron columns 14 inches diameter, with broad bases, sustain the bridge, and shorter columns the stairways. These higher columns will be used as lamp posts. The bridge will be permanently secured at one end and the other

already in progress, a corps of laborers being employed at the corners. The bridge will accommodate those who desire to cross Fulton street on either side of Broadway, as well as those who would cross Broadway itself.

Our reporter feels indebted to Mr. J. M. Duclos for facilities afforded him in procuring the facts in relation to the structure and dimensions of the work.

## Chilled Shot.

Messrs. Hick, Hargreaves & Co. are now making shot and shell of Bessemer steel for rifled cannon of 9-inch bore. The shot are solid cylindrical flat-fronted projectiles, and are slightly tapered at the fore end. They are 14 inches long, and are fitted at the back with a disc of soft brass, (containing a preponderance of copper), which is intended for filling the rifling of the gun by expansion. The brass disc has at its back a projecting rim of about three-sixteenths of an inch thickness, and an equal depth, which forms an expanding cap, the sides of this cap being driven out laterally and forced into the grooves of the gun by the explosion of the powder. The pressure of the gases in the chamber of the gun is also made use of to secure the disc to the shot. The base of the latter is provided with 12 radial grooves, the segments between these forming incline planes. The brass is forced into these grooves by the explosion, and is firmly combined with the shot itself. The shells are of similar shape to the shot, but are but are bored out of solid Bessemer steel cylinders, and fitted with cast-iron hemispherical fronts. The workmanship of these projectiles is very fine; and each of them is carefully packed in a separate wooden case for transport. Their destination is unknown. A considerable number of chills for cast-

tool being inserted in the front of the boring bar, and held fast in its position by a pair of screws. Great numbers of such chills are in request, as they are rapidly destroyed in the casting of chilled shot. There is no doubt but that these carefully-finished chills must considerably enhance the prime cost of chilled shot.

## SOMETHING ABOUT CLOCKS.

Clocks may be considered a modern invention. Even within a few years great improvements have been made in their manufacture by which they may be ranked among the commonest articles of household convenience because of their cheapness, while at the same time their value as accurate time-pieces is not impaired. This result is due to the employment of machinery instead of hand labor in their construction, by which rapidity, exactness, and the reduplication of parts is secured.

The first time-measurements of which we have any historical knowledge were sun-dials, similar probably to those now used merely as curiosities. But before that period, time was undoubtedly measured by the observation of natural objects, particularly the relative length of shadows cast by fixed objects. In the book of Job, one of the oldest of preserved writings, he refers to this mode of measuring time when he says, chap. vii, 2-4:—

As a servant earnestly desireth the shadow and as an hireling looketh for the reward of his work, so am I made to possess months of vanity and wearisome nights are appointed to me. When I lie down I say, When shall I arise and the night be gone. And I am full of tossings to and fro unto the dawning of the day.

This custom has obtained even to our own days. Many now living remember how, in the country, where no more re-

liable means were at hand, the dinner hour and the time for ceasing labor on the farm were determined by the length of shadows cast by familiar objects. The sun-dial, however, in some shape, has been used for many centuries. We remember when in the school room we watched lines on the window sill, scratched with a pocket knife, to cheer the tedium of the "hope deferred" by anticipating the welcome hour of dismissal, or the time of recess.

An improvement on the sun-dial was the clepsydra, a vessel containing water which found its way, drop by drop, through a minute aperture. These water clocks appear to have been of very early invention. They were used by the Chaldeans, and introduced into Europe by the Romans. The hour-glass was a great improvement, and was used within the memory of persons now living, as measurers of time, especially in the school room, and these cannot forget the couplet in the "New England Primer"—

"As runs the Glass,  
Our Life doth pass."

Sand glasses registering three or four minutes are now used as attachments to egg-boilers, and also at sea for some nautical calculations.

We have no certain data for fixing the invention of clocks which were in any degree similar to those now used. Indeed, the only characteristics of these early time-measurers which they have in common with ours, is that they had wheels, one or more pointers, or a bell, and were moved by weights. Such or a similar machine is spoken of as being sent to Frederic II., by the Sultan of Egypt. Calmet in speaking of the customs of the Cistercian monks in 1120, alludes to the striking of the clock to awaken them to attend to their devotions. Dante, who died in 1321, speaks of the striking of a clock. About 1364 Henri de Wyck, a German mechanic, erected a clock in the palace of Charles V., of France. Most of the historical evidence which is reliable seems to point to this period as the first introduction of clocks, and to the fact that the Germans were the most successful clock makers.

The discovery of the isochronism of the pendulum by Galileo and its application to the regulation of clock work by his son, Vincenti, appears to have been the starting point from which the art of horology has reached its present state of perfection. Christian Huygens, however, seems to deserve credit for constructing pendulum clocks, which were really valuable and reliable, although Richard Harris, of London, claims to have antedated the improvements of Huygens by sixteen years, he having used the pendulum successfully in 1641, while Huygens claims are dated 1657.

To come nearer to our own times, who has not seen the Dutch clocks generally brought to this country by English and German emigrants? They had no cases, only a dial, behind which were the works, the whole being suspended from a nail on the wall near the ceiling. The weights hung by strings, and could descend to the floor, while the clock was wound up by pulling a cord. Still later we have the long-cased clock, so beautifully characterized by Longfellow in his poem, "The Old Clock on the Stairs."

Somewhat back from the village street  
Stands the old-fashioned country seat;  
Across its antique portico  
Tall poplar trees their shadows throw,  
While from its station in the hall  
The ancient timepiece says to all:  
Forever—Never—  
Never—Forever.

Halfway up the stairs it stands,  
And points and beckons with its hands  
From its case of massive oak,  
Like a monk, who, under his cloak,  
Crosses himself, and sighs, alas!  
With sorrowful voice to all who pass,—  
Forever—Never—  
Never—Forever.

These old clocks had pendulums beating whole seconds and running eight days, both of which were provided for by the length of the case, which extended from the floor to the ceiling, at least in low ceiled houses, being six or seven feet high. The story of the suitor who hid in the clock case from the prying investigation of the irate father is familiar to all. Many of these old-fashioned clocks showed, in a semi-circle above the face, the changes of the moon, and all were ornamented with quaint pictures on glass. To many of our readers this brief reference to the old-fashioned clock will bring a recollection of pleasant seasons and scenes not to be again enjoyed or viewed.

The last phase of clock making is the introduction of the Yankee clocks, convenient, cheap, portable, excellent time-keepers, and models for workmanship without unnecessary finish. We have seen good clocks sold at retail for seventy-five cents, and even now they can be bought for a dollar or two, while the old-fashioned, long clock was considered a splendid article of furniture and a handsome dower for a bride. These cheaply acquired clocks, however, have not the life-long influence of the more costly ones of preceding generations. Then a clock was one of the household Penates, not to be parted with, but as precious as were her household gods to Rachel when she hid them under her camel's saddle. But the Yankee clocks have not only furnished every house in our land, but from their cheapness have found their way into the cottages of English laborers and the dwellings of the original clockmakers, the Germans.

#### A NEW METHOD OF SAPONIFICATION.

[For the Scientific American.]

Mege Mouries, a distinguished French chemist, has recently found that the neutral fats in the oil seeds during germination, as well as in the animal organism during life, take the state of very movable globules, which offer to the action of reagents a great surface. In this globular state fats show very peculiar properties, from which we will only mention those calculated to interest the readers of this journal.

1. In the ordinary state, fat, as for instance, tallow, soon becomes rancid upon exposure to the air: in the globular

state and in a milky form, however; or in the dry state, in the form of a white powder, it will remain for a length of time without alteration. For all practical purposes this is easily obtained by mixing melted tallow of 113° Fah., with water of the same temperature, holding in solution 5 to 10 per cent of soap.

2. In the ordinary state it is difficult to combine tallow as well as other fatty bodies with hot salty caustic lyes, but in the globular state they absorb this lye immediately in a proportion varying with the temperature. Each globule, as it is attacked from all sides by the alkali, gives in such a case its glycerin quickly off and in such a degree that in a very short time each globule is transformed into a globule of perfect soap filled with lye. Two to three hours are sufficient for obtaining such a result.

3. These saponified fat globules have the property, when heated over 140° Fah., of running off the surplus lye with which they are swelled or filled, and of retaining only water for ordinary soap. They thus eventually become transparent (semi-liquid) and by stirring, form a layer of melted soap over the lye, containing the glycerin.

4. The saponification of this mass is so complete, that for the preparation of stearic acid it is only necessary to add a corresponding quantity of diluted sulphuric acid, whereupon sulphate of soda will be formed and the fatty acids separated.

It is then only necessary to melt them by the application of steam for the purpose of separating them from the solution of sulphate of soda, to let them crystallize, and to press them cold. Stearic acid will be obtained, unchanged, inodorous, and with a melting point of 136° to 138° Fah., while the oleic acid, flowing off, will be nearly colorless.

The latter is even of a better quality than fat oils, and more desirable and useful for the manufacture of white soaps of first quality either alone or with other fatty substances. By using oleic acid alone (the glycerin being separated) it is only required to neutralize the same with weak lye: the formation of soap then takes place immediately, which can be melted at once. If, however, the oleic acid be mixed with ordinary fats, the process described under (1) must be followed. Saponification can be effected in 6 hours and in the course of 24 hours a soap can be prepared as neutral and good and of the same detergent qualities as the best old olive-oil soap found in commerce. By this method not only is more time saved but no fat is lost in saponification, whereas in the ordinary process no small quantity of fat is wasted by running in the under lye.

Mege Mouries manufactures at present in his factory near Paris 3,000 pounds of fatty acids daily, separating the whole amount of the stearic acid existing in the fats and using at the same time the oleic acid obtained thereby for the manufacture of soap.

A. O.

#### THE COTTON MANUFACTURE—RING SPINNING AND DRESSING.

The yarn spun upon the mule is usually intended for the "filling" that portion which carries the threads across the width of the cloth, and is generally softer spun than that for the "warp" or length-wise threads. This warp yarn is spun on the throstle or the ring spinner. The throstle is not materially different in its operation from the fly frame which twists the roving although much simpler in its construction. Like the fly frame it spins and winds the yarn upon spools by means of fliers. The ring spinner is a more modern machine, and it winds the yarn upon a cone-shaped bobbin which, when filled, resembles the cop formed by the mule. This yarn is frequently used, as that of the cop, for filling, as the bobbin containing it is adapted for being carried in the shuttle. The ring spinner is a machine of peculiar construction. The spindles carrying the spools are arranged on the sides of the frame vertically and driven at a high speed. They project through openings in a horizontal bar, each aperture considerably larger than the diameter of the full spool. These apertures have a projecting rim standing above the general surface of the bar, which rim is flanged on the upper edge making a projecting lip. A little coil of thin steel made from strips resembling in size the mainspring of a watch, is slipped or sprung over the lip of the ring and slides around its circumference. This coil or loop of steel is called a "traveler." It is simply a ring of thin steel perhaps one-eighth of an inch wide, the diameter of the ring less than one-fourth of an inch. Being of a fine spring temper the two ends of the ring can be spread and sprung over the lip of the ring in the horizontal bar, the elasticity causing the ends to grasp the ring to prevent flying off.

The object of these "travelers" is to guide the thread on to the spool. As the spindles revolve the thread, passing through the "traveler," carries it around with great velocity, and the horizontal bar traversing vertically back and forth, winds the yarn upon the spools in regular concentric layers. In all these spinning machines the roving is led between rollers, the under ones being of fluted steel and the upper of iron covered with smooth leather and weighted.

It remains now to convert this yarn, both warp and filling, into cloth unless the intention is the production of thread. If this is the object, doubling and twisting, starching and glazing and other processes for preparing it for the market, follow the process of spinning; but our object is to follow the yarn through the most important after processes to convert it into cloth. In some establishments the hard twisted yarn or warp is re-wound on larger spools for "warping." This process is simply winding the yarn on a "beam" or immense spool, the length of which corresponds with the width of the cloth to be woven. Huge "creels" or frames hold the bobbins of yarn, and through suitable guides the yarn is wound upon the beams. The beam, being filled, is taken to a machine called a "dresser." A number of beams are placed in

suitable bearings at each end of the machine, and the yarn is led toward the center where it is again re-wound upon other beams. But during its passage of twelve or fifteen feet it has undergone quite a change.

All yarn when first spun is "fuzzy" or bearded, full of fibers sticking out from its surface in all directions. These fibers on the warp yarn would considerably interfere with the weaving, and as they cannot be so readily removed and their removal would impair the "body" of the cloth, they are glued down; or, rather, the yarn is sized or starched. This is done on the dresser. The yarn as unwound from the beam passes through a trough of starch, and as it leaves the trough the superincumbent starch is scraped off by the yarn passing through minute perforations in sheets of copper, while immense brushes traverse back and forth on the web cleaning and smoothing the yarn and brushing off the loosely adhering particles of starch. The yarn is thoroughly dried by suitable heaters, the pipes of which pass close to the web, and by blowers keeping up a constant blast of air. Consequently the yarn is dried very rapidly, and when re-wound on the beam is ready to be placed in the loom. The room where this dressing is done is, of course, kept very hot, but we never heard that the occupation is unhealthy.

In the next and final article we will notice the operation of weaving and the subsequent manipulations to prepare the cloth for the market.

#### TRADE MARKS—GILLOTT'S 303.

Our reference to the law of trade marks in an article on the general subject last week, received a happy illustration before it was fairly published, in a decision at the General Term of the (New York) Supreme Court, in the case of Joseph Gillott against Richard Easbrook and others. "Gillott's 303" has been for many years a household word in this country, expressing an exact description and quality of pen, which was bought and sold by name alone, needing no examination, only an assurance of its genuineness. It is clear that the use of this number had become lucrative, and might be made so by any one who should adopt it, and that its value in either case results from the long sustained and high character of Joseph Gillott's manufacture alone. If any result of labor and skill can be property, the reputation and significance which the number "303" as applied to pens had acquired, was the property of Joseph Gillott. The trespasser in the above case was not charged with forging the name of the rival manufacturer, but with appropriating the mark which he had made valuable, and offering to the public another "303," virtually represented as different only in the manufacturer's name, and thus profiting by the public confidence in that brand, which Gillott's manufacture had inspired. In the absence of a patent, the right arises with the inducement to infringe it, from the value acquired by long and meritorious use—not from the mere prior adoption of a number. The case has been vigorously contested by the defendants from court to court with the aid of very eminent counsel, and although the decision above referred to and preceding ones were all against them, they may yet perhaps carry the question still higher until it shall be settled beyond appeal or debate.

A NEAR VIEW OF THE FUTURE.—A sleepy traveller dreamed the other day of riding across the continent by rail, and heard among other sounds the voice of the brakeman at intervals sent through the half-opened door in words like these:

"Chicago. Change cars for New Orleans." "Missouri River. Change cars for Saskatchewan, Leavenworth and Galveston." "Rocky mountains. Change cars for Santa Fe, El Paso, Matamoros and the City of Mexico." "Salt Lake—twenty minutes for dinner. Change cars for Fort Benton, British Columbia, Pah Renegat, Panama, Lima and Valparaiso." "Virginia, Nevada. Change cars for Owee, Columbia River, Puget Sound and Kamshatka." "San Francisco. Passengers for New Zealand, Honolulu, Melbourne, Hong Kong, and all points of Europe, Asia and Africa, will keep their seats till landed on the wharf of the daily line of the Pacific Mail Steamship Company. Baggage checked through to Peking, Calcutta, Grand Cairo, Constantinople, St. Petersburg, Paris and Liverpool."

WET YEAR.—There was more rain in 1866 than in any previous year since 1831, and 12.29 inches more than the average of that period, while the evaporation was 3.77 inches less.

#### NEW PUBLICATIONS.

CATALOGUE OF CASTS OF FOSSILS from the Principal Museums of Europe and America; with short descriptions and illustrations. By Henry A. Ward, A.M., F.G.S., Professor of the Natural Sciences in the University of Rochester. Rochester: Barton & Andrews, 1866. 8vo. pp. 228.

We value highly this addition to our scientific library of reference. The general reader also will find it "stranger than fiction," and, as it is a little book, a cheap and ready means of becoming acquainted with the old fossil world, so far as it is yet known to man. The author has obtained these casts by the slow labor of years, and copies are now offered for sale.

AN ELEMENTARY MANUAL OF QUALITATIVE CHEMICAL ANALYSIS. By Maurice Perkins, Nott Professor of Analytical Chemistry in Union College. New York: John Wiley and Son, 1867. Small 8vo. pp. 65.

This little manual consists of a selection of three or four of the most characteristic reactions, with a system of analysis for each of the more commonly occurring metals, acids, and radicals on the plan pursued in the laboratory for the instruction of the Engineering Department of Union College.

GARDENING FOR PROFIT: A Guide to the Successful Cultivation of the Market and Family Garden. By Peter Henderson. New York: Orange Judd & Co. 12mo, pp. 250.

This treatise is by an experienced Market Gardener, and is a practical, business-like manual of advice: just such a talk as we should wish to have before engaging in gardening, from an intelligent man who has followed the business as a business all his life.

AMERICAN HORTICULTURAL ANNUAL, 1867. A Year Book of Horticultural Progress, for the Professional and Amateur Gardener, Fruit Grower, and Florist. New York: Orange Judd & Co., 12mo, pp. 150.

This beautiful Year Book and Almanac will do well to accompany the above noticed volume.