

Scientific Museum.

The English Railway.

The Editor of the Horticulturist, Mr. A. J. Downing, now in England, is writing home a series of letters upon the different matters that meet his eye. Here is a few words upon the English railway system:—

The last word reminds me that I must say a word or two here, about the English railways. In point of speed I think their reputation out-runs the fact. I did not find their average, (with the exception of the road between Liverpool and London,) much above that of our best northern and eastern roads. They make for instance, hardly twenty miles an hour with the ordinary trains, and about thirty-six miles an hour with the express trains. But the perfect order and system with which they are managed; the obliging civility of all persons in the employment of the companies to travellers, and the quietness with which the business of the road is carried on, strikes an American very strongly. For example, suppose you are on a railroad at home. You are about to approach a small town, where you may leave and take up, perhaps, twenty passengers. As soon as the town is in sight, the engine or its whistle begins to scream out—the bell rings—the steam whizzes—and the train stops. Out hurry the way passengers, in rush the new comers. Again the bell rings, the steam whizzes, and with a noise something between a screech and a yell, but more infernal than either—a noise that deafens the old ladies, delights the boys, and frightens all the horses, off rushes the train—whizzing and yelling over a mile or two of country, before it takes breath for the like process at the next station.

In the English railway you seldom hear the scream of the steam whistle at all. It is not considered part of the business of the engineer to disturb the peace of the whole neighborhood, and inform them that the train are coming. The guard at the station notices the train when it first comes in sight. He immediately rings a hand bell, just loud enough to warn the passengers in the station to get ready. The train arrives—no yelling, screaming, or whizzing—possibly a gentle letting off of the steam—quite a necessary thing—not at all for effect. The passengers get out, and others get in, and are all carefully seated by the aforesaid guard or guards. When this is all done, the guard of the station gives a tinkle or two with the hand bell again, to signify to the conductor that all is ready, and off the train darts as if it knew screaming to be a thing not tolerated in good society. But the difference is national after all. Bull says in his railroad, as in every thing else, "steady—all right." Brother Jonathan, "clear the coast—go ahead!" Still, as our most philosophical writer has said, it is only boys and savages who scream—men learn to control themselves—we hope to see the time when our people shall find out the advantage of possessing power without making a noise about it.

If we may take a lesson from the English in the management of railways, they might learn vastly more from us in the accommodation of passengers. What are called "first class carriages" on the English rails, are thoroughly comfortable, in the English sense of the word. They have seats for six,—each doubled cushioned, padded, and set off from the rest, like the easy chair of an alderman, in which you can entrench yourself and imagine that the world was made for you alone. But only a small part of the travel in England is in first class cars, for it is a luxury that must be paid for in hard gold—costing four or five times as much as the most comfortable travelling in the United States. And the second class cars—in which the great majority of the British people really travel—what are they? Neat boxes, in which you may sit down on a perfectly smooth board, and find out all the softness that lies in the grain of deal or good English oak—for they are guiltless of all cushions. Our neighbors of this side of the Atlantic have been so long accustomed to catering for the upper class in this

country, that the fact that the railroad is the most democratic institution of the day, has not yet dawned upon them in all its breadth. An American rail-car, built to carry a large number in luxurious comfort, at a price that seems fabulous in England, pays better profits by the immense travel it begets, than the ill devised first and second class carriages of the English railways.

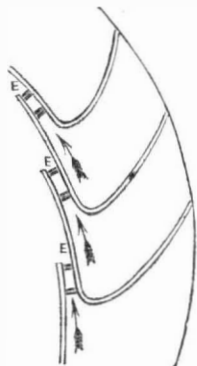
For the Scientific American.
Hydraulics.
(Continued from page 232.)
FIG. 40.



VENTILATED WHEELS FOR LOW FALLS.—

In England iron suspension wheels were built at an early period of the present century, as stated in an able paper on the subject by Mr. Fairbairn, of Manchester, Eng. In the early construction of such wheels, the arms and braces were fixed to the centre by screws and nuts upon their ends, as shown by fig. 40. The arms, C C, passed through the rim, B B, and the braces, E E, which traverse the angle of the rim, F F, are about the same as were employed in the earliest suspension iron wheels. This arrangement was convenient for tightening up the braces, but owing to the liability of the nuts becoming loose, it was difficult to keep the wheels true to the circle. The kind of keys (Gibs & Cotter's) used in steam engines, have been used as substitutes for the nuts, and with the best results.

FIG. 41.



If the process of filling and emptying the buckets, in fig. 41, be traced respectively in each, it will be found that, in the event of a large body of water being discharged into the buckets, they could not be filled if the openings at E E were closed and the air prevented from escaping in that direction; the air would be compressed and pent up in the bucket, and the water would be prevented from entering or blown out; this will not happen when the wheel is properly ventilated, and a free passage left open for the air, in the direction of E. The passages for the exit of the air are represented by the arrows, and the connection of the buckets with one another, is represented by rivets and tubular blocks. When a wheel of this kind is heavily loaded a small quantity of the water will sometimes escape along with the air above the lips of the outlets, E E, into the inside of the wheels, but this is not of much consequence, as the water comes back again, but this defect may easily be remedied by carrying the edge of the plate higher upon the sole of the upper bucket.

A quick and easy outlet for the water, when no longer required upon the wheel, is as important as an expeditious inlet; and it is evident that every drop of water which is carried by the wheel beyond the vertical line of the centre, is so much useless absorption of its pow-

er; moreover, in the construction of the bucket for the reception of the water, strict reference should also be had to its free and uninterrupted discharge. Another main point of consideration is the distance to which the water is carried, by its momentum or centrifugal action, when leaving the wheel; and it will be found advantageous to effect the discharge of water as soon as the bucket passes the lower edge of the stone-breast. This discharge being seldom accomplished in time in the old wheels, was a serious counterpoise to the power of the wheel, as the ascending buckets carried with them portions of the water to a considerable height, on the opposite side of the vertical centre. In the improved construction this defect is obviated; as the opening which allows the air to escape during the filling of the bucket re-admits it with facility during the discharge; there cannot, consequently, be any formation of a partial vacuum; and the wheel not only works easily, but to a much greater depth in the backwater. It has also been found necessary, in order to facilitate the escape of the water, to terminate the breast at a distance of about ten inches to the vertical centre, and always to have a depth from eighteen inches to two feet of water under the bottom of the wheel.

These are considerations of some value, as the abrupt termination of the breast admits of a much quicker discharge of water from the buckets; and the increased depth of the tail-race gives room for its escape, after it has passed from the wheel. In fact, the benefits arising from this form of breast and tail-race are so great, that they should be strictly enforced where it is desirable to have the full and effective use of the fall. In the erection of water wheels, these principles should never be lost sight of; and instead of a shallow tail-race, with the water running from the wheel at the rate of from six to eight feet per second, as is frequently the case with the old wheels, the current should be scarcely perceptible and the water should flow steadily and as smooth as in a deep canal.

Light at Last.

The following lucid explanation of the mystery of the knocking spirits, from a recent work by A. J. Davis, sets the whole matter before the public as clear as mud.

"I now proceed to explain how spirits can move a table or other inorganic substances: A spirit, without possessing any of the grossness of the earthly form, is yet organized in its principles and functions precisely as we are in this life; and when it, a spirit, desires to move a table, (by way of manifesting its nearness,) it concentrates its own magnetic and powerful elements so as to take hold, as it were, of the magnetism of the atmosphere. In like manner this atmospherical magnetism takes hold of the electricity of the air, and the latter is then concentrated upon the article which it is the spirit's design to move. Atmospherical magnetism and electricities are, therefore, the nerves and muscles which spirits employ in manifesting their presence to the material senses of believing as well as skeptical individuals. Hence, when "rappings" are heard, and when it is certain that no mischievous or designing person is producing them by way of imitation, then it is perfectly reasonable to conclude, as has been hitherto explained, that a friendly spirit from the spirit-land is producing electrical rolling concussions upon some material substances through the intermediate agencies of terrestrial magnetism and electricity. The modus operandi of these phenomena I design not now to detail; because at present it is deemed sufficient for mankind to know that it is both naturally and philosophically possible for spirits to approach and influence heavy and gross bodies of matter."

Chain of Being.

Bitumen and sulphur form the link between earth and metals—vitriols unite metals with salts—crystalizations connect salts with stones—the amianthus and lythopites form a kind of tie between stone and plants—the polypus unites plants to insects—the tube worm seems to lead to shells and reptiles—the water serpent and the eel form a passage from reptiles

to fish—the anas nigra are a medium between fishes and birds; the bat and the flying-squirrel link birds to quadrupeds—and the monkey equally gives the hand to the quadruped and to man.

LITERARY NOTICES.

GLEASON'S PICTORIAL DRAWING-ROOM COMPANION.—This elegant Pictorial has been sent to us by Mr. S. French, No. 151 Nassau st.; we have examined it, and we are frank to acknowledge it to be, in every respect, one of the most beautiful issues of the American newspaper press we have ever seen. The paper has a polished satin surface, the typography is good, and the woodcuts are finely executed. This effort of Mr. Gleason must meet with great success. The literary matter is of a high order, and we can, with propriety, recommend it to the family circle.

The Magazines for April are exceedingly beautiful.—Graham's has an elegant stipple engraving of "The Italian Girl," an exquisitely finished fashion plate of Wedding Dresses, and "The Home of Milton." Lowell, Tuckerman, Prentice, Boker, and several other eminent authors, appear as contributors. The number throughout is excellent.

Sartain's, for this month, has fifteen embellishments: "Our Little Brother," by Mr. Sartain, is a superb mezzotint; "A victorious Armanent Returning to a Greek City," is one of the finest pictures we have ever seen. "The Resurrection of Christ" is a good line engraving, and the continuation of the scenes in his life afford profit to the reader, and enhances the merit of the magazine. We are gratified at the success which attends the labors of the publishers.

The Ladies' National has a fine mezzotint by J. D. Gross, of "Feeding the Chicken;" "Fashions," "Village Homes," and "Plans for Gardens," comprise the engravings. The contributions to this serial have always been of the finest order, although less in quantity than some of its cotemporaries. This is a good number.

Messrs. Dewitt & Davenport, Tribune Buildings, have these magazines for sale.

THE INTERNATIONAL MAGAZINE, for April, embraces a choice variety of the best literature of the day; it contains original papers by Dr. Mayo, G. P. R. James, Bayard Taylor, Alfred B. Street, and others of eminent literary attainments. The embellishments are of marked interest. This magazine has already attained a high place among its cotemporaries, and deserves all and more than it receives. Stringer & Townsend, 222 Broadway, publishers, at the remarkable low price of \$4 per annum.

HARPER'S NEW MONTHLY MAGAZINE, for April, has a finely executed portrait of Washington Irving, the accomplished writer, and a view of "Sunny Side," his residence on the Hudson. It has also a portrait of W. C. Bryant, his residence, etc., besides several views of the searching expedition for Sir John Franklin in the Polar Seas. The humorous scenes are spirited, and would do honor to the veritable "Punch." The success of this enterprise is unparalleled, it having reached the enormous circulation of 60,000 per month. The selection evinces judgment and discrimination. Terms \$3 per annum.

THE PHOTOGRAPHIC ART JOURNAL.—No. 3 of this Journal, H. H. Snelling, editor, W. B. Smith publisher, contains an excellent article on the "Researches on Light;" "A Treatise on Photography," (an excellent one), and a number of other good articles. This is an able magazine.

MECHANICS

INVENTORS AND MANUFACTURERS.

The Best Mechanical Paper IN THE WORLD! SIXTH VOLUME OF THE SCIENTIFIC AMERICAN.

The Publishers of the SCIENTIFIC AMERICAN respectfully give notice that the SIXTH VOLUME of this valuable journal, commenced on the 21st of September last. The character of the SCIENTIFIC AMERICAN is too well known throughout the country to require a detailed account of the various subjects discussed through its columns.

It enjoys a more extensive and influential circulation than any other journal of its class in America. It is published weekly, as heretofore, in *Quarterly Form*, on fine paper, affording, at the end of the year, an ILLUSTRATED ENCYCLOPEDIA, of over FOUR HUNDRED PAGES, with an Index, and from FIVE to SIX HUNDRED ORIGINAL ENGRAVINGS, described by letters of reference; besides a vast amount of practical information concerning the progress of SCIENTIFIC and MECHANICAL IMPROVEMENTS, CHEMISTRY, CIVIL ENGINEERING, MANUFACTURING in its various branches, ARCHITECTURE, MASONRY, BOTANY,—in short, it embraces the entire range of the Arts and Sciences.

It also possesses an original feature not found in any other weekly journal in the country, viz., an *Official List of PATENT CLAIMS*, prepared expressly for its columns at the Patent Office,—thus constituting it the "AMERICAN REPERTORY OF INVENTIONS."

TERMS—\$2 a year; \$1 for six months.

All Letters must be Post Paid and directed to
MUNN & CO.,
Publishers of the Scientific American,
128 Fulton street, New York.

INDUCEMENTS FOR CLUBBING.

Any person who will send us four subscribers for six months, at our regular rates, shall be entitled to one copy for the same length of time; or we will furnish—
10 copies for 6 mos., \$8 15 copies for 12 mos., \$22 10 " 12 " \$15 20 " 12 " \$25
Southern and Western Money taken at par for subscriptions; or Post Office Stamps taken at their full value.

PREMIUM.

Any person sending us three subscribers will be entitled to a copy of the "History of Propellers and Steam Navigation," re-published in book form—having first appeared in a series of articles published in the fifth Volume of the Scientific American. It is one of the most complete works upon the subject ever issued, and contains about ninety engravings—price 75 cents.