Scientific American.

ESTABLISHED 1846.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included.....$3 20
One copy, six months, postage included..... 1 60

Club Rates.

Ten copies, one year, each $2 70, postage included.....$27 00
Over ten copies, same rate each, postage included..... 2 70

☞ The postage is payable in advance by the publishers, and the subscriber then receives the paper free of charge.

NOTE.—Persons subscribing will please to give their full names, and Post Office and State address, plainly written. In case of changing residence state former address, as well as give the new one. No changes can be made unless the former address is given.

Scientific American Supplement.

A distinct paper from the SCIENTIFIC AMERICAN, but of the same size, and published simultaneously with the regular edition.

TERMS.

One year by mail.....$5 00
SCIENTIFIC AMERICAN and SUPPLEMENT, to one address..... 7 00
Single Copies..... 10

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & Co., 37 Park Row, N. Y.

☞ Subscriptions received and single copies of either paper sold by all the news agents.

VOLUME XXXIV., No 26. [NEW SERIES.] *Thirty-first Year.*

NEW YORK, SATURDAY, JUNE 24, 1876.

Contents.

(Illustrated articles are marked with an asterisk.)

THE SCIENTIFIC AMERICAN SUPPLEMENT.

No. 26.

For the Week ending June 24, 1876.

TABLE OF CONTENTS.

The Scientific American Supplement

is a distinctive publication issued weekly; every number contains 16 octavo pages, with handsome cover, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

COMBINED RATES.—The SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT will be sent together for one year, postage free to subscribers, on receipt of $7.00.

TO SCIENTIFIC AMERICAN SUBSCRIBERS WHO WISH TO TAKE THE SUPPLEMENT.—A subscriber to the SCIENTIFIC AMERICAN may change at any time to the SUPPLEMENT, or may have both papers sent to him, by remitting to us the difference between the amount already paid for the SCIENTIFIC AMERICAN and the SUPPLEMENT prices above mentioned.
Remit by postal order. Address

MUNN & CO., PUBLISHERS,
37 Park Row, New York.

All the numbers of the SUPPLEMENT from its commencement, January 1, 1876, can be supplied; subscriptions date with No. 1 unless otherwise ordered.

☞ Single copies of any desired number of the SUPPLEMENT sent to any address on receipt of 10 cents.

Crystallized Osmium.

MM. Ste. Claire Deville and Debray have recently obtained osmium in a crystallized state, by making an alloy of the element with tin and treating it with nitric acid. All the tin is separated, and the residue of osmium is finely crystallized. The density of osmium is found to be equal to 22·477, and is greater than that of any other known body.

THE END OF THE VOLUME.

The presence of the index at the close of this number of the SCIENTIFIC AMERICAN will remind our readers that we have reached the end of another volume, the thirty-fourth of the present series. It is not because we fall into that proverbial failing of all humanity which believes the last accomplished work to be the worthiest that we confidently believe that the now finished volume is the best we have ever issued. The assertion is fact—fact in theory, because newspapers as a rule reverse natural laws, and grow better as they grow older; and fact in practice, because the contents of the many pages say so.

Few occurrences of any note in the world of Science or invention have happened during the past six months, but that our readers have been fully posted thereupon. In great engineering works we have described and illustrated the massive anchorage of the East river bridge, the Metlac viaduct in Mexico, the St. Charles railroad bridge in Missouri, the La Vanne aqueduct in France, the New York Elevated and the projected Underground Railway, the Callowhill street bridge in Philadelphia, besides many others. Few new machines of any importance have appeared in the world during the entire six months, but we have published full accounts thereof. Among the more prominent are the Brayton oil engine, the Allen governor, Manes' rotary furnace, Stirling's locomotive-reversing gear, Dean Brothers' pumps, the new English multiple drilling machines, and scores of other fresh and novel inventions. The valuable papers on Practical Mechanism—more reliable and more thoroughly practical aids to the workman than have ever before appeared—have been continued. Hundreds of trade secrets and useful recipes, gleaned from every possible source, have been gathered. The principal scientific discoveries we have fully discussed. Edison's supposed new electric force, Galton's new theory of heredity, the manufacture of dynamite, electrical organs, wells as a source of power, the magnetic spectrum, are a few of the principal subjects under this heading. Lastly, we have published many beautiful illustrations of the Centennial Exposition, with descriptions of prominent exhibits. These descriptions, with illustrations, will be continued through the following volume

THE SCIENTIFIC AMERICAN SUPPLEMENT

The regular weekly issue of the SUPPLEMENT as a distinctive publication, for a special subscription price, has enabled us to supply our many friends with an immense amount of additional detailed information in all the principal branches of science. It would be difficult to find any fresh subject of note or interest in the scientific world that has not been brought to the reader's notice.

The first volume of the SCIENTIFIC AMERICAN SUPPLEMENT has been illustrated by about one thousand three hundred figures and engravings.

The International Exhibition has formed, and will during the year continue to form, one of the principal features in both of our papers. We have already given in the SUPPLEMENT over one hundred engravings, showing the progress up to date. The next volume will be full of illustrations of new and remarkable exhibits. In presenting the details of this great enterprise, we are specially assisted by able and experienced men of science; and in addition, we aim to avail ourselves of whatever is interesting and reliable, as observed by cotemporaries.

The series of letters on Mechanical Drawing, by Professor MacCord, have proved acceptable to thousands of persons. About one hundred and thirty illustrations have so far been given. The series will be continued in the next volume of the SUPPLEMENT. The peculiarity of these instructions is that they show how any person, even the unskilled—the poorest persons, those who cannot afford to buy instruments—may learn to draw.

Another useful series of articles is entitled "How to Build Cheap Boats." It is accompanied by illustrations of particulars. The series embraces nearly one hundred and fifty engravings, and illustrates the method of boat building, from the humble scow, costing three dollars, up to the graceful Whitehall row boat, costing fifteen or twenty dollars: also sail boats, their rigging, etc., with details:

A number of the most important engineering works and structures have been illustrated and described in the SUPPLEMENT. Among these are the great Jetty Works of Captain Eads, at the mouth of the Mississippi river, by which the seven-foot bar has already been removed to a depth of twenty feet. The illustrations include a complete plan of the works, details of the construction, and measurements and particulars, by Chief Assistant Engineer Corthell.

The great St. Gothard tunnel through the Alps, Switzerland, has been illustrated by many figures. Among these the drilling machines and the compressed air locomotives have been engraved and explained.

In the Department of Mechanics and Engineering, a large number of valuable practical papers, by experienced writers, have been presented with illustrations; the same may be said of all the principal divisions of science, such as Chemistry, Metallurgy, Technology, Electricity, Light, Heat, Sound-Geology, Mineralogy, Natural History, Astronomy, and Medicine: The latest and most interesting intelligence has been sought out and presented.

In the matter of quantity, estimated in book measure, this just completed volume of the SCIENTIFIC AMERICAN SUPPLEMENT contains the matter of over three thousand five hundred book pages, or more than seven volumes of five hundred pages each. Thus the yearly issues of the SUPPLEMENT, costing only five dollars, will equal fourteen ordinary book volumes. The exceeding cheapness of our publication will be appreciated if we consider that all this reading matter is, for the most part, standard in its character, and worthy of preservation for future reference.

For the convenience of readers, the first volume of the SCIENTIFIC AMERICAN SUPPLEMENT, twenty-six numbers, January—June, 1876, has been bound in paper covers, and may be had at this office and at news stores throughout the country, price $2.50. Sent by mail to any address.

INVENTORS MISJUDGED.

The inventors of this country owe Hon. J. H. Bagley, of New York, a debt of gratitude for a very excellent speech, recently made by him in the House of Representatives, in their behalf and that of the Patent Office. A defense of a class and an institution to which the United States owes so large a proportion of its material prosperity might well have been looked upon as a superfluity; but Mr. Bagley on one hand has discerned that, among certain people, inventors, through no fault of theirs, or rather through their misfortunes, are receiving unmerited odium; and on the other, he is aware of the false economy which, for the purpose of making political capital, has induced some of our lawmakers to contemplate crippling the resources of the Patent Office. The speech includes careful research, showing the self-supporting nature of this branch of government service, and the advantages which it has secured, and besides pays a noble tribute to the class for whom the Patent Office is mainly intended, and by whom it is solely maintained. There are a few points in the discourse which Mr. Bagley touched lightly upon, but which deserve more extended remark. We note that he specifies the grangers as being among those most strongly prejudiced against inventors, who, as they imagine, by securing patents, act in direct opposition to public interest, and engender monopolies. If such a notion is prevalent, it is, to say the least, an ignorant one; for without the labor of the inventors, it may well be asked, what would that of modern agriculturists be? If any Western farmer, who is now complacently surveying his hundreds of broad acres of waving grain, and reckoning the profits of his crop, were informed that his harvest had to be gathered with scythe and sickle, without doubt he would protest that such would be impossible, and that all his gains would be swallowed in lost time and injured over-ripe crops. Doubtless he would admit that his reapers and mowers, not to say the machines he used for planting and plowing and cultivating, are worth in direct saving a good round sum. If every granger who objects to patents will make a calculation of this kind for his individual case, and then multiply it by the number of those who use improved machinery, he will find that the value of the inventor's work for a single season's crop probably approaches, if it does not exceed, every cent the inventors have ever earned. He will also discover that the profits are directly turned into the pockets of his class in such a proportion that the inventor's gains are utterly infinitesimal; and if he will look into the future, and consider that these profits will accrue to his posterity forever, while the returns of the inventor cease, certainly within half a century, perhaps he will see how little basis there is for charges of monopoly and extortion, so freely hurled at men because they ask an absurdly meager return for the benefits they give.

There is another point, based on sound truth; and it is, in a very great number of cases, the inventors are not those who reap the chief reward. There are plenty of wideawake sharp people, who know a good thing when they see it, and are ready to snap at it, with cash in hand. These are constantly on the watch for new inventions; and during the period, when the inventor has secured his patent and is looking about to see how best to realize returns, they are down upon him like hawks. If, as is too frequently the case, the inventor is in financial straits, the offer of cash for an idea of which he, least of all, correctly knows the value is generally a potent temptation. The patent is assigned for a song; Smith's device becomes famous, but Smith gets no profits. Brown, who has purchased it, revels in a plethoric bank account, while Smith gets empty fame diluted with abuse as a monopolist. If Brown happens to be dishonest, and, with Smith's idea as a basis, swindles—and farmers and agricultural implements are peculiarly favored as object and means in this regard—Smith shoulders the odium. No one thinks of denouncing the mere agent; it is the inventor and the grinding patent system that are blindly vituperated. Of course inventors have a right to sell their property to whom and for what they choose; but, as Mr. Bagley, with much truth, suggests, if they would be more persistent in introducing their devices into public use themselves, they would obtain much more sympathy and much greater profits.

Much, however, of the opposition to inventors and their patented devices arises from the misconceived idea that the patent laws are intended solely for the benefit of inventors. Now, as we have repeatedly explained, such is not the case. True, they hold out an inducement which has for its object to make people invent; but that inducement is a monopoly closely limited in point of time, and during the existence of which the inventor developes his idea. Consequently, at the end of the protected period, the invention becomes public property in its improved and not in its crude form. Therefore it is obvious that to denounce the patent system is merely to denounce that which insures great benefits to every one, at an absurdly small cost. As for the means whereby the patent laws are enforced, the fact is undeniable that, in this sad period of official corruption, the Patent Office stands forth pure and unblemished. Instead of its appropriations being exceeded, as is the case in some departments of the government, it has a balance of nearly $900,000 to its credit in the United States Treas-