

# Scientific American.

ESTABLISHED 1845.

MUNN &amp; 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

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

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

Remit by postal order. Address

MUNN &amp; CO., 37 Park Row, New York.

## The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is 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 SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses, as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN &amp; CO., 37 Park Row, N. Y.

## Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

VOL. XXXIX, No. 26. [NEW SERIES.] *Thirty-third Year.*

NEW YORK, SATURDAY, DECEMBER 28, 1878.

## Contents.

(Illustrated articles are marked with an asterisk.)

Adhesive material, good.....	407	Lard oil, to scent (3).....	409
Alum in baking powders.....	404	Matter, basis of.....	402
Anvil, Eagle.....	462	Mechanics, animal.....	403
Astronomical notes.....	404	Men and machinery.....	407
Back pressure (19).....	409	Millboard, to prepare (5).....	409
Banks, protection to.....	401	Observatory, National, the.....	401
Blindness, color, remedy for.....	408	Oil, kerosene, to deodorize (29).....	409
Bolt cutter, improved.....	405	Pads in P. O., comp. for (37).....	409
Bottle stopper, new.....	404	Patent suits.....	400
Caps for toy pistols (27).....	409	Phosphor bronze (30).....	403
Car heating apparatus.....	406	Photographs, remarkable.....	399
Cement, insoluble.....	399	Plaster of Paris.....	402
Concentrate your effort.....	405	Press, cutting and stamping.....	406
Cottons, English, trouble with.....	399	Rainfall in N. Y., average (33).....	409
Dials, illuminated.....	402	Reamers, to temper (8).....	409
Education, technical.....	408	Salt deposits, remarkable.....	402
Eggs, serpents', how made (26).....	409	Saw tooth, inserted, new.....	406
End of 1878.....	401	Scientific Am. an educator.....	400
Experience, curious.....	406	Surveys, national, our.....	405
Factories, Southern.....	404	Tobacco smoke.....	402
Furnace for zinc.....	402	Trade mark decision.....	401
Furnace, revolving, Manes'.....	401	Training, mechanical.....	403
Fusel oil, to remove.....	408	Tunneling, accurate.....	406
Grape vines, big.....	401	Tunnel under British channel.....	401
Hog cholera commission.....	401	Turtle, taking, mode of.....	399
Industrial development.....	405	Vault, new, the.....	402
Improvements, iron working.....	406	Velocipede, best time (1).....	409
Invention, amend. to discourage.....	407	Wells, driven.....	408
Inventions, new.....	407	Windmills.....	405
Inventions, new agricultural.....	402	Wine cask, Hungarian, great.....	406
Inventions, new mechanical.....	404		

## TABLE OF CONTENTS OF

### THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 156,

For the Week ending December 28, 1878.

I. ENGINEERING AND MECHANICS.—Institution of Civil Engineers. The Avonmouth dock. The River Lagan and Harbor of Belfast. The Whitehaven Harbor and Dock works.	
II. TECHNOLOGY.—Improvement in Sugar cane Mills, 3 engravings.—Artificial Decortication of Trees by heat, 2 engravings.—Artesian Wells. The Artesian wells of San Francisco. Their depth, strata passed through, quantity and quality of water, etc., with map and two diagrams. Singular abundance of water.—The Niagara Falls Mill. Description of a monster flouring mill, and a site of unlimited and economical power, with 1 illustration. Photography in Natural Colors.—Condensed Milk.	
III. FRENCH INTERNATIONAL EXHIBITION OF 1878.—New Rotary Printing Press for Illustrated Papers, 1 engraving.—A Californian Jewel Casket.—Fowler's Hauling Engine, 1 engraving.—English Fanning Mill, Elevator, and Weighing Machine, 1 engraving.	
IV. CHEMISTRY AND METALLURGY.—Chas. Adolphe Wurtz. Biographical sketch, with enumeration of his services to chemistry. The Constitution of Matter in the Gaseous State. Lecture delivered before the Fellows of the Chemical Society, London, by CHAS. ADOLPHE WURTZ, Member de l'Institut, Doyen Honoraire de la Faculte de Medecine de Paris. Explanation of the kinetic theory of gases. Why it is impossible to liquefy certain gases by pressure alone. The apparatus and processes of MM. Cailliet and Raoul Pictet in liquefying oxygen and hydrogen. The law of Avogadro.	
V. ELECTRICITY, LIGHT, HEAT, ETC.—Telephone Improvements. 2 figures.—Trouve's Micro-Telephone. 3 figures.	
VI. NATURAL HISTORY, GEOLOGY, ETC.—Professor Harkness, F. R. S. Biographical sketch, with portrait.—Air Temperature.—The Crater of Vesuvius. The recent eruption, with 1 illustration.	
VII. MISCELLANEOUS.—Remarkable Automata. 1 illustration.—Jardiniere in Silver. 1 engraving.	

Price 10 cents. For sale by all newsdealers.

## THE END OF 1878.

With this number we close the thirty-ninth volume of the SCIENTIFIC AMERICAN, and with it the record of the year's events.

Does that record contain anything that will make 1878 a notable year in the calendar of the century? What are the claims of the year to the respect and memory of the future?

That a war in Europe has ended, and one in Asia begun; that Europe is still suffering financial and industrial depression, while our more favored land is well advanced toward a solid prosperity greater than we have known before; that the much talked of socialistic uprising in America has ended in talk, while in Europe that conspiracy against civilization remains a source of national peril; that we have enjoyed harvests of unrivaled bountifulness, while other regions—in South America, North Africa, India, and China—have been smitten with drought and famine. These occurrences, however big with importance to the present dwellers upon earth, will but faintly interest humanity in 1978, and have but small effect probably upon the world's welfare in future ages. Possibly some obscure inventor, perhaps so poor that he is troubled to raise money enough to pay his patent fees, may have developed some thought or discovered some principle that will influence the future more than all these great events together, which will do more to signalize the year just ending than the achievements of all other men combined. It may be that discoveries, now well known but little esteemed, contain the germs of scientific, social, and industrial revolutions. It is quite possible too that those recent discoveries and inventions, to which the world is looking for the grandest results, will quickly fade into comparative insignificance. Every age is blind to the elements of its own greatness; and, as a rule, the unheralded achievement is the one that after-ages chiefly magnify.

But, to drop philosophy for fact, what, that is specially noteworthy from the standpoint of the present, has been done during the past year? It has been a year of great activity in almost every region of effort. The outposts of every science have been more or less advanced, and the main army of occupation, pressing into regions of the unknown and the obscurely known, has moved forward perhaps as steadily as during any year of the past; yet few events stand out with special prominence, very few promise to open up new lines of research, new fields of industrial enterprise, or new interpretations of the phenomena of nature.

No striking geographical or geological discoveries have been made—unless we admit the caverns of Luray—and no extraordinary engineering enterprises have been begun or finished, with the single exception, perhaps, of the transference of Cleopatra's Needle from the bank of the Nile to that of the Thames. In mechanics, inventions and improvements have been many and valuable; yet we fail to recall one that is radically novel. If the magnetic motor people dispute the assertion, we shall be happy to retract it on the submission of proof of their claims. In physics, the microphone has made much noise out of little; but that interesting toy cannot justly be accredited to 1878. Mr. Edison's microtasmeter promises to rank among the most powerful and valuable of scientific instruments for exploring the secrets of nature; but with the exception of its use in measuring the heat of stars and that of the sun's corona, its revelations are prospective. The solar eclipse of July 29, which was made notable by the first public employment of the tasimeter, is notable also for the opportunity it afforded for demonstrating the existence of one or more intra-Mercurial planets, first seen by American astronomers. The discovery of an active crater in the moon by Dr. Hermann Klein seems to prove that volcanic energy is still at work on our satellite; an inference very strongly corroborated by the later observations of Mr. Hammes, described in the SCIENTIFIC AMERICAN last week.

During the latter part of the year the excitement in regard to the progress of the electric light presents a notable feature of the year's record. Apparently this is at present the field of greatest speculative and practical activity. The use of electric illumination is spreading rapidly, and there are on all sides promises of the speedy practical solution of the great problem. As yet, however, with the exception of the Sawyer-Man lamp, no device which seriously threatens the supremacy of illuminating gas has been made public.

The fairly successful Exhibition at Paris, however important in its time, presented no feature or achievement to give it lasting fame. The duplexing of the Atlantic cable marks but a step, though an important one, in a familiar path of progress. The same may be said of the discovery of one or two new metals in chemistry, and the successful synthesis of indigo. The recent claim of Mr. Lockyer that he is convinced of the essential oneness of the elements, and is able to demonstrate that all matter is fundamentally the same, is much more likely to mark an era in the history of science—if it turns out to be true; and a century hence it may be the best known achievement of 1878.

## PATENT SUITS.

A patent suit is now in progress between the "Tubular Lantern" and the "Buckeye Lantern" Companies, in which some interesting questions come up for consideration. The Tubular Lantern Company own a patent in which air is received into an annular chamber surrounding the chimney above the globe, from whence it passes through two pipes extending downward to another air chamber beneath the burner, and from thence to the flame to keep up combustion.

The products of combustion as they rise through the chimney draw in air from the lower air chamber, which is supplied mainly as indicated above, and by this means a constant supply of pure air is kept up to the burner. On top of the chimney are "deflecting plates," arranged to act as an ejector when a current of air strikes the lamp, and on the air chamber are similar deflecting plates, which act as an injector, by which means the equilibrium of the air pressure is kept up, and the flame is thus prevented from being extinguished under an ordinary wind.

In the Buckeye lantern, manufactured at Bellaire, O., there is no chamber around the chimney, and no pipes to carry the air downward; but there are two globes, one within the other, so combined with the framework of the lamp that the air for the support of combustion is taken from the space between the globes, which is open at top to admit fresh air, except for a plate (similar to the reflector in ordinary lanterns) which is set a little above the opening, and which is stated by the counsel for the complainants (Mr. Thacher, of Chicago) to act as an injector to force air into the space between the globes, and in this he is borne out by the testimony of the complainant's expert. The defendant's counsel (Col. Dyer, of Washington, D. C.), takes the contrary ground that the plate referred to is nothing more than an ordinary reflector, and that even if the space between the globes is the equivalent of the annular air chamber in the complainant's patent, the reflector is in no sense an injector, in which he is supported by the testimony of the defendant's experts, who testify unqualifiedly that the reflector acts rather as an ejector than as an injector, and claim that they can prove this by actual tests.

It will be seen from the above that there is a great difference in the construction of the lanterns, and that this difference causes considerable variation in the mode of operation of the two, inasmuch as in the "Tubular" lantern the equilibrium of pressure is kept up by two columns of air traveling at fast speed through small pipes, while in the "Buckeye" the air is taken from the chamber between the globes, which is of such capacity as to form a column of air counterbalancing that in the flame chamber, by which means an equilibrium is kept up, which, from the large source of supply, is not so easily affected by extraneous currents, and hence needs no injector to regulate or increase the influx. From this difference of construction and operation it is argued that the annular air chamber in one and the air reservoir in the other cannot be considered an equivalent for each other even if the same end is served by both, and that as the reflector does not force air into the reservoir, it cannot be the equivalent for the "deflecting plates" of the "Tubular" lantern, which is the main point in controversy, as lanterns having air chambers and tubes, substantially like those in the "Tubular," were known long before the invention of complainant's lantern.

The introduction of the lantern in controversy in this suit—the "Buckeye"—shows what can be done with a good invention, even if times are bad and money scarce. The company owning this patent have only been in operation a short time, and yet their sales of this lantern have of late averaged about 2,500 dozen per month, giving employment to about 150 hands, and distributing a large amount of money among a class of people sadly in want of it.

A number of suits, upwards of thirty, we believe, have been commenced against different manufacturers and dealers in "barbed wire fences," by Messrs. Coburn & Thacher, acting for the Washburn & Moen Manufacturing Company, and I. L. Ellwood, who claim to hold patents covering the manufacture of barbed wire fence of any form. The defense set up is previous use, the defendants alleging that a barbed wire fence had been used some twenty years ago in Texas and Missouri. It would appear, however, that this point is doubted by the complainants, who bring a large number of witnesses to prove that such a fence had never been used in the places specified, and that no one except the witnesses for the defense, of which, however there are many, ever knew of such a fence having been made or used, and that at the best, even if it is admitted that such a fence was made, it could only be considered as an abandoned experiment, or as a "lost art," like the Connor safe, in the Fitzgerald case.

## THE SCIENTIFIC AMERICAN AS AN EDUCATOR.

It is becoming more and more the custom of manufacturers to express their approval of the SCIENTIFIC AMERICAN, and their desire to benefit their employes by presenting the latter with annual subscriptions to this paper. We are assured that the practice is directly profitable to the givers in increasing the kindness of the relations between the employer and the employed, and also—more materially—in augmenting the skill and intelligence of the recipients of the gift.

We are indeed very frequently in receipt of letters from readers of the SCIENTIFIC AMERICAN—both employers and employed—expressing their indebtedness to it for very much of their skill, intelligence, and success in life. Not unfrequently men write saying, "I am foreman of So & So's shop," or "I am proprietor of such or such an establishment," or "I am the patentee of this, that, or the other successful invention, and I owe everything to the suggestions, information, and practical habits of mind acquired in the diligent perusal of the SCIENTIFIC AMERICAN." We need not say that such letters are extremely gratifying to us, while they intensify our desire to make the paper more and more worthy of its readers' approval.

As an illustration of the advantage which may accrue not