5....

Scientific American. ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN

TERMS FOR THE SCIENTIFIC AMERICAN.

..... 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 ame proportionate rate. Postage prepaid.

Remit by postal order. Address MUNN & CO., 37 Park Row, New York.

A. E. BEACH.

To Advertisers.-The regular circulation of the SCIENTIFIC AMERICAN is now Fifty Thousand Copies weekly. For 1880 the publishers anticipate a still larger circulation.

The Scientific American Supplement]

is a distinct paper from the SCIENTFIC AMERICAN. THE SUPPLEMENT is issued weeky. Every number contains 16 octavo pages, with handsome cover.uniform in size with SCIENTFIC AMERICAN. Terms of subscription for SUPPLEMENT, 50 (a) year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country. **Combined Rates.** — The SCIENTFIC AMERICAN and SUPPLEMENT will be sent for one year, postage tree, on receipt of seven dollars. Both papers to one address or different addresses, as desired. The safest way to remit is by first, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

Scientific American Export Edition. The Scientific American Export Edition is a large and splendid peri-odical, 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. IFF Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed an-nouncements published in this edition at a very moderate cost. The SCIENTIFIC AMERICAN EXPORT Edition has a large guaranteed ircu-lation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

NEW YORK, SATURDAY, MARCH 6, 1880.

Contents. (Illustrated articles are marked with an asterisk.)

Ali Baba vase 1	48	Fatent
American industries* 1	49	Photog
Astronomical notes 1	48	Phyllox
Back numbers and volumes 1	54	Plant pe
Battery, Leclanche (1) 1	.00	Populat
Carpenter's gauge, improved * 1	41	Proa La
Cotton, winter, in Georgia 1	52	Rivetin
Crab, hairy [*] 1 Engines for farmers 1	53	Rubber,
Engines for farmers	47	SCIENTI
Etching on glass 1	49	Shovel
Farming, scientific, practical . 1		Solar sp
Flax and linen trades, British 1	45	Sounds,
Fluid propeller or motor* 1	47	Steame
Horses. fast 1	53	Steam r
Industries, American [*] 1		Sugar b
Inventions, engineering 1	54	Sun spo
Inventions, recent 1	51	Telepho
Iron, rolled, manufacture of * 1	43	Ti me pie
Job shops and slop shops 1	54 '	Touraco
Lawn edge mower* 1		Toys, se
Life, theory of 1	52	Triching
Lighting, gas and electric 1	44 ·	U.S. as
Mechanical engineers, Am. So. of 1	45	Vaccina
Metal veins, prospecting* 1	54	Wells, a
Meteorite, new, a* 1	45	Wheat
Microscopy, recent progress in 1	51 1	Yacht,
(m) an at son 1	40	

	144 !	
atent law, new, proposed	144	4
hotography, hydrocellulose in.		1
hylloxera in California	153 ·	
lant perfumes, extracting	1	ł
opulation, industrial, of France	152	-
roa Ladronia*	150	(
liveting, hydraulic*	146	
Rubber, to finish (1)	155	8
CIENTIFIC AMERICAN catalog'e.	146	
hovelplow point, improved *	152	۲
alon enotes	148	
olar spots *	154	t
ounds, new way of studying		U
teamers, small, inspection of	145	
team packing, improved *	150	ł
ugar beet industry in Delaware.	153	ł
un spots	152	
elephone lines, induction in (4).	155	6
imepieces, certification of	145	•
ouracou	153	ł
ovs. scientific*	151 :	T
richinosis	147	
J. S. as a wheat country		8
accination and science.	148	t
Vells, artesian, for Colorado	154	
Vheat heaters	152	
acht. power required for (2)	155	

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 218.

For the Week ending March 6, 1880.

Price 10 cents. For sale by all newsdealers.

PAGE ENGINEERING AND MECHANICS.—The Cylindroid.—By JOHN W. GRIFFITHS. Fig. 1. The Cylindroid.—Fig. 2. The new steam-ship Manhatan The Garrett Submarine Torpedo Bost. 1 figure A Dry Canal for Ships. Toellner's method of overland trans-pertation. 3 Represe \$466

Turner's Gas Engine. A singularly simple and conversion models ifgure. St. Mary's Church, Brighton. Full pa e illustration and plan. Suggestions in architecture. A Belgian Permanent Exhibition..... Railroad Shakes. By S. W. ROBINSON... Early Suggestions Concerning the Castin and Production of Heavy Ordnance. 3466 3466 3478 3478

 TECHNOLOGY AND CHEMISTRY.—The Diamond. Its origin, artificial production, and uses. By H. A. MOTT, Jr., Ph. D. How the fluxmond is found. The original formation of the diamond. Artificial production of diamonds. The use of the diamond. Ammonia from Atmospheric Air. Muller & Geisenberger's method...... 3474 3474

..... \$468

THE PROPOSED NEW PATENT LAW.

passed without any consideration whatever, but few memthere are 293 members in a full house.

follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter in any suit brought in any court having jurisdiction in patent cases for an alleged use or infringement of any patented article, device, process, invention, or discovery, where it shall appear that the defendant in such suit purchased the same in good faith for his own personal use from the manufacturer thereof, or from a person or firm engaged in the open sale or practical application thereof, and applied the same for and to his own use and not for sale, if the plaintiff shall recover a judgment for five dollars or less, as damages, the court shall adjudge that he pay all costs of suit; and if the plaintiff shall not recover the sum of twenty dollars or over, the court shall adjudge him to pay all his own costs, unless it shall also appear that the defendant at the time of such purchase or practical application had knowledge or actual notice of the existence of such patent: *Provided*, That nothing contained herein shall apply to articles manufactured outside of the United States.

Passed the House of Representatives February 9, 1880. GEORGE M. ADAMS, CLERK. Attest :

It certainly seems very ridiculous, after the many years measure has been brought forward, and thus "railroaded" through the lower House, for the "protection of farmers" from the extortions of patentees, which is now the principal credited with having the influence at Washington which can accomplish such results, and the manner in which the bill was passed, as well as the promptitude with which this justification of its provisions is furnished, carry conclusive proof, if any were needed other than that afforded by the bill itself, that the work is only one other "neat little job" of a well-paid lobby. Already before those most interested have had an opportunity to judge of the merits of the bill, a leading New York daily has some cut-and-dried arguments to urge in its support, put in what is judged to be a popular way, which may be summarized as follows: That sharpers have succeeded in imposing upon many people-especially farmers-by selling them what the seller did not own, or had no right to sell: that the patent laws are complicated. and common people cannot be expected to understand them, and that, therefore, the patentee should help make good to an infringer any loss which the latter maysuffer from throwing away his money on swindlers.

The foundation of our patent system rests only on the constitutional provision that "Congress shall have power to secure to inventors for limited times the exclusive right to their discoveries." Congress, at an early day in our history, enacted laws in pursuance of this provision, which, although they have been many times changed, have always retained this distinctive feature: they give to the inventor the ' exclusive" right to his inventions. Congress may constitutionally enact that patents shall hereafter be "limited" to a year, or six months only, or may repeal the patent law and all patents so far issued have "secured" such exclusive grand experimental demonstrations. right, so far as the law is concerned. This bill would tion runs through all our jurisprudence, and every man is and requires five horse power to drive it.

punish the criminal; but this bill cannot fail to act as a pre-On the 9th February the committee on the Revision of the 'mium for those who have a turn for this sort of enterprise, Laws of the United States House of Representatives, on a as it virtually confiscates to their use the property of thoumotion to suspend the rules, succeeded in rushing through sands of patentees. The law holds, in regard to all other that body a bill "To regulate the practice in suits brought kinds of property, that the purchaser is bound to exercise to recover damages for the infringement of patents." The due care and discretion to see that the seller is the owner of bill is a very different one from that which was so elabo- or has the right to sell that which he offers, without which rately discussed previous to its passage by the Senate and there can be no bona fide sale; but this bill not only relieves defeat in the House last year, and, coming as it did from the the purchaser of a patent from any obligation to exercise Committee on the Revision of the Laws, instead of from the such care and diligence, but actually lays a fine upon the Committee on Patents, took everybody by surprise; it was rightful owner for establishing his legal title in the courts. We do not for a moment believe that the bill in its present bers understanding its provisions, and only 126 voting, when form can pass the Senate; but if it should be amended there, and go back again to the House, we trust it will then be The extraordinary haste with which it was put through fully discussed, with such ample explanation of its prowas such that, we understand, the bill had not even been visions as the great importance of the subject calls for; if printed when it passed the House. The official text is as this innocent measure "to regulate practice," etc., comesup again in this way, we shall have no fears of its being then AN ACT to regulate practice in suits brough to recover rushed through so precipitately, notwithstanding the urgent damages for infringement of patent. reasons which the "Third House" may adduce for prompt reasons which the "Third House" may adduce for prompt

action-on behalf of "the farmers," of course.

..... APPROXIMATE ECONOMY OF GAS AND ELECTRIC LIGHTING.

Taken by itself a cipher is an innocent thing and amounts to nothing; but its presence or absence in a series of figures sometimes makes an important difference in the summing of results. We presume that most of our readers must have noticed the errors resulting from the omission of ciphers in the article in our paper of February 21, under the above heading. As the subject is one of interest we think the best way is to republish the article, corrected as it should have been printed, and therefore give it as follows:

It is not in every place or position that the electric light can be employed in lieu of gas; but under some circumstances, for example, in spacious apartments, where large numbers of gas lights are used, the electrical method of during which some of the ablest members of both Houses lighting may now be adopted with satisfactory success. of Congress have been unsuccessful in perfecting a patent Under such conditions, and with gas costing the excessively bill which would meet all objections, to pretend that this high prices that we are accustomed to pay, the superior economy of electricity over gas has been conclusively settled on this side of the Atlantic. We might cite various examples, but for our present purpose one will be enough, point urged in its favor. "Farmers" are not generally to wit, the Riverside Worsted Mills, Providence, R. I., where the Brush electric lights have been in regular use for about one year past-long enough to determine approximately their actual expenses and merits.

> In one portion of the above mills 1,000 gas lights were used, each of 15 candles intensity, yielding an aggregate of 15,000 candles, and costing \$12.25 per hour to run them, or $\frac{82}{1000}$ of a cent per candle per hour.

> We are not informed as to the exact cost of the gas per 1,000 cubic feet, but we figure it to be \$2.45.

> In lieu of the above 1,000 gas lights 80 electric lights were substituted, each of 2,000 candles intensity, yielding an aggregate of 160,000 candles, and costing 80 cents per hour to run them, or $\frac{1}{2000}$ of a cent per candle per hour.

> If we have not been misinformed as to the above estimates of costs and intensities, it would appear that gas lighting, at the mills named, was over a hundred and sixty times more costly than electric lighting, quantity of light produced being considered.

> It may not be uninteresting briefly to compare the probable economies of Mr. Edison's new system of lighting with the foregoing results.

Mr. Edison's method has, to be sure, as yet only reached the stage of experiments. But it must be remembered that his trials have been made on an extensive scale, with fullsized electrical machines and apparatus, expressly with a view to show and determine what the practical introduction of the invention, wherever used, would accomplish. We have his authority for saying that the generous sum of one entirely; but plainly any right at all which a patent gives hundred thousand dollars in cash was placed at his free dismust, according to the Constitution, be an "exclusive" one, posal, by his associates, to be used as he saw fit for these

In a word, Mr. Edison's plan is to furnish small electrical destroy the inventor's exclusive right, for it makes the con- lamps, each having the intensity, he tells us, of an ordinary ditions so favorable for infringers, and bears so inequitably gas light of fifteen candles, burning five cubic feet of gas per upon patentees, that it would be utterly impossible for hour. He states that he gets ten lamps, or 150 candles, of thousands of the latter to maintain their rights. That igno- light per hour per horse power of engine; and that each of rance of the law is never a bar to punishment for its viola. his new electrical machines furnishes 750 candles of light

Applying the Edison system to the Riverside Mills and to

Spectrum of the Electric Spark Between Magnesium Points The Temperature of the Carbon Points in the Electric Lamp	3469
New Electric Burner. By, M. PERRUCHE The Highest Magnifying Power Ever Reached	8469 8469
A Cheap and Simple Camera for the Microscope. 2 figures. A Cheap camera lucida On the Number of Vibrations Necessary for the Recognition of	3469
Pitch By Prof. A. E. DOLBEAR. The Touroscope. 1 figure. Photographs of Microscopic Objects.	3469 3470
IV. GEOGRAPHY, ETCThe Old Northwest. The historical and industrial development of Ohio. Indiana, Illinois, Michigan, and Wisconsin	9469
Wisconsin Proposed Starting Points of the Mediterranean and Timbuctoo Railway	3468
V. ASTRONOMY.—The Sun's Radiant Energy. By S. P. LANGLEY. 5 figures. Instrumental measurement of the Sun's heat The Sun as a Source of Power. By S. P. LANGLEY. 3 figures. The Pyrheliouncier.—Ericsson's Solar Caloric Engine—Section of	
reflector and boiler Mars. Results of recent explorations of the disk of Mars.—How Mars differs from the Earth The Earth Five Hundred Million Years Old	3472 3473
VI HYGIENE AND MEDICINE - The New Anæsthetic The Bro- mide of Ethyl. By R. J. LEVIS, M. D The Influence of Shock on Memory. By Dr. R. O. COWLING. Five remarkable cases, with comments.	3475 3475
VII. AGRICULTURE, ETC American Apples in Europe. By E. R. BILLINGS Manna Production in Italy.	3476 3478
New Use for Hemps Two Valuable Insecticides. London purple. Pyrethrum powder The Chinch Bug – Amount of injury it causes. Ravages of Phyllexera. Milk Beer.	3477 3477

expected to know what the law is; but here we are, it seems, to have an exception, in the case of a man who wishes to the replacement of the 1,000 gas lights, we have the followuse a patent without paying the patentee, for which this bill ing approximate results.

practically offers a premium. Another constitutional obto do, and must perform, many things, often at great cost, in order to fulfill the conditions imposed, and the law says he shall have in return certain benefits; when the patentee sion.

That there have been thousands of people swindled-not only farmers, but men of all classes-in buying articles ma nufactured by infringers of patents, cannot be denied. One would think that the remedy for this evil should be sought in legislation to more certainly detect and more effectually

Number of Edison lamps required, 1,000; number of Edi jection is also to be found in that provision which prohibits son machines required to run the lamps, 20; engine power the passage of any law "impairing the obligation of con needed, 100 h. p. Approximate cost of the Edison plant, tracts." The inventor obtaining a patent obligates himself \$16,000. Approximate cost of running the same, delivering 15,000 candles of light per hour, including 6 per cent interest on the plant, \$1.66 per hour, or $\frac{111}{1000}$ of a cent per candle per hour. This estimate allows no royalty to the owners of has fulfilled the conditions, and invested large sums of the patents. Thus the approximate cost of gas lights at the money, under the rights with which he has been legally Riverside Mills is seven and a half times more than the same vested, to arbitrarily deprive him of the benefits would be quantity of light would be under the Edison system. And practically a direct violation of this constitutional provi- the cost of the Edison system would, approximately, be twenty-two times more than the cost of the same quantity of electrical light as delivered by the present Brush machines. Side by side the fractions stand as follows:

Approximate costs of lighting per candle per hour:

Gas lights.	Edison lights.	Brush lights.
Too of a cent.	$\frac{1}{1000}$ of a cent.	$\frac{1}{200}$ of a cent.