

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT No. 261 BROADWAY, 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.

Remit by postal order. Address MUNN & CO., 261 Broadway, corner of Warren street, 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, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 19 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 & CO., 261 Broadway, corner of Warren street, New York.

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., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, MARCH 18, 1882.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Agricultural inventions, Asiatic tribes in North America, Bacteria, transformation of, etc., with corresponding page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 324,

For the week ending March 18, 1882.

Price 10 cents. For sale by all newsdealers

Table listing contents of the supplement by category: I. ENGINEERING AND MECHANICS, II. CHEMISTRY, III. BIOLOGY, ETC., IV. HORTICULTURE, SILK CULTURE, ETC., V. TECHNOLOGY, ETC., VI. ART, ARCHITECTURE, ETC., VII. ELECTRICITY, MAGNETISM, ETC., VIII. MISCELLANEOUS.

PROPOSED PATENT LEGISLATION.

Several bills of general interest to patentees are now awaiting action by the Committee on Patents.

Senate bill No. 1,226, introduced by Mr. Call, February 16, proposes to introduce a novel and questionable practice designed to limit the rights of owners of extended patents. It provides that when letters patent for a valuable invention have been extended, owing to the failure of the patentee to receive reasonable compensation for his invention in consequence of poverty and inability to manufacture and introduce his invention, the extended patent shall not give any right to the exclusive manufacture and sale of the invention. The manufacture and sale must be open to the public, subject only to the payment, to the inventor, of a royalty not exceeding for the first year a net amount of 20 per centum on the cost of the materials used in the manufacture of the article, and diminishing in a regular ratio each successive year during the life of the patent.

The bill further provides that in all cases where letters patent shall be extended under the provisions of the act, the Commissioner of Patents shall advertise the application for the space of three months in some newspaper of general circulation, and a hearing be given to all persons objecting to the extension; the applicant is allowed the right of appeal to the District Court of the United States for the District of Columbia, on giving bond for cost. The cost of the advertisement is to be paid by the inventor if he is able; if not it is to be paid out of the fund subject to the control of the Commissioner of Patents, and remain a lien in favor of the government on the patent until the same is paid.

A bill introduced by Mr. Platt, February 17 (S. 1,238), to regulate practice in suits for infringement where the purchase is made in good faith for the defendant's personal use, provides that if the plaintiff does not recover twenty dollars or over he shall have to pay costs, unless the defendant had actual notice of the existence of the patent or disputes the plaintiff's right to recover anything.

It further provides that when suit is brought against a defendant other than a manufacturer or seller the plaintiff shall first deposit with the clerk of the court the sum of fifty dollars as security for the costs and expenses of the defendant. In case the defendant prevails the deposit (or a "reasonable" part of it) is to be allowed by the court for counsel to the defendant, and the plaintiff will have to pay the costs in addition.

The obvious purpose of this bill is to repress suits against actually or suspected infringers of patented inventions; and while it may be calculated to prevent certain alleged abuses its discrimination against patentees of small inventions is certainly not in harmony with the general spirit of the patent laws.

In the House Mr. Skinner introduced, February 13, a bill to limit the reissue of patents (H. R. 4,353). It forbids the reissue of patents except within three months of the issue of the patent in all new cases, and within three months of the passage of the proposed act in case of all patents already in existence.

The principle of limiting the period during which a patent may be surrendered for reissue is good; but it may reasonably be questioned whether a three months' limit is not too brief.

A bill introduced by Mr. Vance, February 20 (H. R. 4,573), makes it the duty of the Attorney General to take legal proceedings in equity in the Supreme Court of the District of Columbia to secure the annulling of any patent which he has ground for believing to have been procured by fraud or misrepresentation. In case the party at whose complaint the proceeding is begun fails to establish the invalidity of the patent he will have to pay the costs incurred by the Attorney General in the litigation.

THE TRANSFORMATION OF BACTERIA.

The transformation of the innocent bacteria usually found in healthy organisms into the specific forms associated with certain more or less malignant diseases is something quite unexpected and altogether contrary to prevailing theories; yet the experiments lately made by Dr. Rosenberger, at Wurzburg, strongly indicate that such may sometimes be the case.

Dr. Rosenberger's experiments were begun to determine the cause of the death of an animal poisoned with a septicæmic virus, which had been heated so as to destroy all the bacteria in it. The prevailing belief is that cooked virus is simply a poison, and that the injection of it into the blood of a healthy animal kills as strychnia does, as a poison, not as an infection. To decide this question septic blood and serum were heated, filtered, evaporated, and then injected. The animals died with all the symptoms and pathological appearances of septicæmia, just as if uncooked virus had been used. The only effect of the cooking was to lessen the virulence of the poison, which, however, was redeveloped in the blood of the animals poisoned. To insure the killing of all the micro-organisms in the cooked virus, the virus was exposed to a temperature of 140° Cent. for two hours; and that this temperature was sufficient to sterilize the liquid was proved by the inaction of it (the cooked virus) in culture liquids.

The inference from Dr. Rosenberger's observations is, as pointed out by the Lancet, that the application of a degree of heat which apparently sterilizes effectually a septicæmic virus, so far as artificial cultivation of the organism is concerned, does not prevent the virus from producing in the animal body its specific form of septicæmic and of septic

bacteria. From these facts the startling conclusion is drawn that the bacteria are not primary but secondary elements in the morbid process, and that their development is associated with a chemical or at least unorganized poison; a poison, however, which the bacteria are the means, and the only means, of multiplying in the animal body. Since these septic bacteria are not contained in the cooked virus when it is injected, the question arises: How then do they come to be in the poisoned animal, which was previously without them?

Dr. Rosenberger holds that they arise from the non-specific bacteria already in the organism; in other words, that under certain conditions bacteria may radically change their nature, so that from being harmless they become virulently malignant. This conclusion is in harmony with the results of Buchner's observations, which seemed, though not conclusively, to show that the bacillus of anthrax might be developed from a non-specific fungus found in hay; and also with the observations of Rossbach in connection with the physiological action of papayotin, a chemical ferment of vegetable origin, which, when injected into the blood of a perfectly healthy animal, causes such a multiplication of bacteria as to produce effects comparable with those of a true infection.

If these observations are sustained by further experiments in this direction, the current theories with regard to the origin of certain specific diseases by infection, always and exclusively, will have to be materially modified; and the position maintained by many intelligent physicians in retired places, that specific diseases like typhoid fever, scarlet fever, and the like, do sometimes originate where the theory of infection is untenable, will be abundantly justified.

Effects of High Barometric Pressure.

In connection with the recent high barometric pressure some noteworthy phenomena have occurred. Thus, at Antibes (a seaport in the southeast of France) the sea level was depressed about a foot, laying bare portions of shore over which boats can usually sail, and exposing surprised sea slugs and other marine animals to the direct rays of the sun. This continued about a fortnight, and is attributed by M. Faye to the high air pressure. Again, General de Nansouty reports from the observatory at the top of the Pic du Midi that the lowest temperature there this winter has been only -5° C., and during the recent high pressure, from January 8 to 20, the air being in a state of exceptional purity, temperatures as high as 26° C. were registered. The highest at Bagnères-de-Bigorre is considerably short of this, so that we have here an inversion of temperature with altitude. The General states further that from the 1st of January the zodiacal light was distinctly made out; probably this has never happened before in our climates, so near the winter solstice. Once more, the General and his assistants, on January 20, at 6:30 P. M., saw distinctly the earthshine on the moon and the thin crescent, though only 25 hours 46 minutes old.

Berlin Elevated Railway.

The City Railroad (elevated) in Berlin, built by the government and opened February 7, has cost about \$16,000,000—\$2,300,000 per mile. It was projected (but not by the government) some ten years ago, when Berlin was growing with unexampled rapidity, and the crowding of the city and the rents paid for the poorest quarters were absolutely frightful, and when, too, there were practically no horse railroads. Now there are many street railroads, and the high rents caused such a furor of building that there are said to be 15,000 unrented dwellings in the city. The new road, however, is thought to have fair prospects of financial success. By building it the government avoided an expenditure of \$2,500,000 for a station for one of its roads, and it will be of very great value as a connection of existing railroads, used for bringing suburban trains from various lines into the heart of the city—something as if the suburban trains of the New Jersey roads entered New York over one of the elevated roads and stopped at all its stations.

Mental Distance of the Moon.

M. Plateau lately sought to estimate the distance to which the moon is mentally referred in the sky, by getting some one, after looking at that body, to project the accidental image on a wall, then move to or from the wall till the diameter of the image seemed equal to that of the moon; and he obtained the distance 51 meters. Again, Prof. Thirion, of Namur, got twelve students to draw on a blackboard a circle the size of the moon as it appeared to them. The circles varied from 19 to 79 cm., mean 32 cm., and it was inferred that the moon was mentally referred, on the average, to about 35 meters. Dr. Charpentier, by still another method, obtains the value 12.9 meters, so that there are great differences, and in any case the distance is much less than might have been thought. M. Plateau has, says Nature, further applied accidental images to finding the distance to which the imaginary celestial vault is referred. A spot in a white square of paper on a dark ground was looked at steadily at the side of an open window for twenty seconds, then the person looked skywards, above the opposite houses, then to one of these houses, and compared the sizes of the accidental images in either case. The sides of the two were by one person estimated as 5 to 6, by another as 4 to 5; and the width of street being about 30 meters, the distance assigned to the celestial vault is inferred to be in one case 30, in the other 29 meters. A similar result was got by night.