

# A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXIII.-No. 1. Established 1845.

# NEW YORK, JULY 5, 1890.

**\$3.00 A YEAR.** WEEKLY.

## M. PASTEUR.

# In front of the Pasteur Institute, in Paris, is a bronze statue of a French shepherd boy engaged in a death struggle with a mad dog which had been worrying his sheep. With his bare hands, and with no weapon save his wooden sabot, the boy killed the dog, but was horribly bitten in the fight, and this statue represents an actual struggle which took place in October, 1885. The event gave the now famous French savant his first prominent opportunity of experimenting with his antirabic treatment upon a human being. The treatment was successful, and from that time to this many thousands of persons who have been bitten by rabid animals, of all countries and all stations in life, have been visitors to Pasteur's laboratory, to receive such treatment as would insure them, so far as human science could do so, against a horrible death. The French nation raised a monument to the discoverer of this anti-rabic treatment in the shape of the "Pasteur Institute," and there are now many similar institutions in various parts of the world, including one in New York City. Pasteur commenced his researches on rabies and hydrophobia in 1880, when little was known of the disease except that the virus was contained in the disease was one localized in the nerve centers, find-

of a rabid dog, when injected into a healthy one, causes rabies much more certainly and rapidly than does the injection of the saliva. This also explains the varying times of attack of the disease after a bite, the virus having to travel up the spinal cord before the symptoms can manifest themselves. The next problem was to weaken the virus, which proved a difficult and somewhat complicated task, as previous attempts to cultivate the special microbe of rabies outside the animal body had failed. But Pasteur's perseverance and method overcame the difficulty, and he succeeded in so weakened virus might be bitten with impunity by mad dogs.

The Pasteur treatment has been virulently attacked because it has not always been successful; but this is something which has never been claimed for vaccination for any form of disease. It is estimated that from fifteen to twenty persons out of every hundred bitten by mad dogs or cats develop hydrophobia, but in 2,164 persons treated at the Pasteur Institute to January, 1887, there was a mortality of only 1.4 per cent, while

race between a strong and an attenuated virus. In cases in which the bite occurs near a nerve center, the fatal malady may outstrip the treatment in the race between life and death. If the weakened virus can act in time, it means life; if the strong virus acts first, prevention comes too late, and it means death. So that the treatment is not doubtful in all cases, but only in those which are under well known unfavorable conditions."

But it is not alone for his successful treatment and prevention of hydrophobia that M. Pasteur is entitled far weakening the poison that in his hands it lost its to a high place among the scientists and benefactors virulent effects, while yet remaining potent enough to of the age. In 1857 he inaugurated researches on the act as a preventive, so that dogs inoculated with this action of the mould in the changes it effects on tartaric acid and the process of fermentation, which pointed the way to scientific improvements in brewing and wine making of the greatest value, and were said to be the stepping stones of the present science of bacteriology. He proved that the changes occurring in each of the various processes of fermentation are due to the presence and growth of a minute organism, that every peculiar fermentative change is accompanied by the presence of a special ferment, and this he proved by the most careful experimental inquiry, joined with the the dog's saliva. He first proved by experiment that in 1887 the mortality was reduced to 1.3 per cent, and artificial cultivation of these organisms. In a visit to in 1888 to 1.16 'per cent. As touching this point, Sir a large London brewery, in 1871, he explained by the ing that a portion of the matter of the spinal column Henry Roscoe says : "Pasteur's treatment is really a use of a microscope the cause of a serious state of



M. PASTEUR IN HIS CABINET AT THE PASTEUR INSTITUTE, PARIS.

© 1890 SCIENTIFIC AMERICAN, INC

2

Next in order of time came the investigations of Pasteur in relation to a plague which broke out among the silk worms in the South of France, on account of which the production of silk in that country had almost ceased in 1865. Pasteur plainly pointed out the cause of the trouble, and the means necessary for the alleviation of its effects and ultimate extermination, the latter, however, being an end which has not yet been reached. Other prominent examples of Pasteur's activity in a similar line, at once dependent on the character of microbes and their propagation, had reference to the chicken cholera in France, which he succeeded in practically annihilating, and another disease particularly fatal to cattle and sometimes to man, called splenic fever or wool sorters' disease. The latter plague had been fatal to millions of cattle, but since the adoption of Pasteur's method of inoculation for its prevention, it has now almost disappeared, and the agricultural insurance societies will not insure cattle unless they have been thus inoculated.

In a summary of the life work of Pasteur, delivered at Birmingham, England, in October of last year, Sir Henry E. Roscoe describes him as "a man devoted heart and soul to the investigation of nature, a type of the ideal man of science—whose example may stimu-late even the feeblest to walk in his footsteps, if only for a short distance, whose life is a consistent endeavor to seek after truth, whose watchwords are simplicity, faithfulness, and industry, and whose sole ambition is to succeed in widening the pathway of knowledge, so that following generations of wayfarers may find their journeys lightened and their dangers lessened."

# 

The Accident to the City of Paris, The inquiry instituted by the London board of trade

into the cause of the accident to the Inman line steamer City of Paris has been concluded, and, according to the verdict :

"The primary cause of the casualty was the extraordinary wearing down of the ring in the bracket supporting the extreme end of the propellershaft, whereby the end dropped from its proper position about seven inches, thus producing a bending effect on the shaft at its forward support coexistent with each revolution of the engine. This probably produced a rupture of the external surfaces, gradually extending inward, and finally a total fracture. The cause of the water finding its way into the engine room and other compartments was that a large portion of the low pressure cylinder fell or was driven against the condenser, tearing it away and thereby opening a large communication with the sea, through which the water rushed in such volume that before any of the inlets could be closed they became covered with water and out of reach. The water passed into the dynamo room and port engine room through the bulkheads which were broken by the ruptured machinery, and into the two compartments by the injury to the valve box in the engine room."

The court suggested, as points worthy the consideration of naval architects and marine engineers, but not as intended in any way as an adverse comment upon the vessel, the invention of a governor to control marine engines in the case of similar breakdowns, the desirability of isolating each water-tight compartment as far as possible, and the improvement of the supports of the outboard bearings of long propeller shafts.

### ----The Importance of a Good Specification.

The necessity of having an invention well described and every novel feature of the invention defined in both the drawings and specification preparatory to filing in the Patent Office was well set forth by the late Judge Grier, one of the more distinguished of the patent law judges of the Supreme Court of the United States, when he said, "There are few things more difficult, even for well educated and practical lawyers, than to describe a new invention clearly, and point out the principle which distinguishes the subject of it from all things known before. As inventors are rarely experts, either in philology or law, it has long been established as a rule that their writings are to be scanned with a good degree of charity. But it is easy to abuse this liberality to the purposes of fraud."

Scientisic American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.



#### TERMS FOR THE SCIENTIFIC AMERICAN.

#### The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 15 octavo pages, uniform in size is issued weekly. Kvery number contains 16 octaveries of subscription a weekly. Kvery number contains 16 octaver pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, 55.00 a year, for U.S., Canada or Mexico. \$6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country. See prospectus last page. Combined Rates. The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U.S., Canada or Mexico, on receipt of seven dellars. To foreign countries within Postal Union, nine dellars a year.

#### Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMER-ICAN is a large and splendid illustrated periodical, issued monthly, con-taining floor plans, perspective views, and sheets of constructive details, pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable 4wellings, public buildings and archi-tectural work in great variety. To builders and all who contemplate build-ing this work is invaluable. It as the largest circulation of any architec-tural publication in the world. Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, \$2.50 a year. To foreign Postal Union countries, \$5.00 a year. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, \$5.00 a vear; combined rate for BUILDING EDITION SCIENTIFIC AMERICAN, \$5.00 and SUPPLEMENT, \$3.00 a year. To foreign countries, \$1.50 a year.

The safest way to remit is by postal order, express money order, pratt or bank check. Make all remittances payable to order of MUNN & CO.

NEW YORK, SATURDAY, JULY 5, 1890.

#### Contents.

(Illustrated articles are n	narked with an asterisk.)
luminum, a voiume upon	Locomotives, naphtha,Connelly's Majolica, imitation of Pasteur in his cabinet* Patent specification, importance of good Patentsgranted,weekly record of 1 Pneumatic feat, walking on ceil- ing* Raitroads in Kansas Raitroads in Kansas Raitroads in Kansas Rainvads in Kansas Rubber bubbs. how made Scarlet fever, how to prevent Staßmer City of Paris, the acci- dent to Waking on ceiling head dowu*
Australia	Wax, eiectrified Wealth, where it bas been created

# TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 757.

# For the Week Ending July 5, 1890.

Price 10 cents. For sale by all newsdealers.

PAGE

- ANTHROPOLOGY.—The Warriors of British New Guinea.—By Lieut. B. BADEN-FOWELL.—A little known country and its deni-zens, descriptions of their weapons, ewellings, and customs.—6 il-lustrations. 1209
- . BOTANY.-Goldie's Birthwort.-A gigantic flowering plant which may be grown in asmall pot, its flowers measuring over a foot in diameter.-- lillustration. Mushroom Culture.-Practical notes on the culturation of this popular esculent..... 1209 .. 12059
- III. ELECTRICITY.-A New Form of Electric Chronograph.-By Rev. FREDERICK J. SMITH.-The conditions of accuracy required for this instrument, with example of a recently constructed one. A illustrations. A Remarkable Flash of Lightning.—By W. KOHLKAUSCH.—In. Setigations of a flash of lightning which killed a horse in a barr 12093
- . 12094 12094
- 12094

## FIRE CRACKERS.

The stock of fire crackers in this country at the present time is said to be from twenty-five to thirty per cent less than is usual at this season. This shortage is due in part to labor strikes in China, where all the small crackers and most of the large or cannon crackers are made, and also to the imposition by the Chinese government of the lekin, or tax, both of which have acted as a check upon manufacturers. Strikes are of frequent occurrence in China, and laborers are thoroughly organized, having what are here called unions and guilds. Strikes are sometimes attended with loss of property as well as of life.

The annual receipts of fire crackers in this country are from eight hundred thousand to one million boxes, and orders for these goods have to be sent forward one year in advance. The Chinese manufacturing year begins June 1, and this is about the date when American merchants send forward their orders for next year's supply. The usual voyage from New York to Hong Kong is 120 days, so that there are only left, after a passage to China and return, 125 days of the year. The ship Wandering Jew arrived in New York on April 29 with 135,000 boxes of fire crackers on board, and she is the last ship which can arrive before the Fourth of July, the Great Admiral, now on the way, not being due until August 1.

It is, therefore, positively known that there will be a short supply of fire crackers, and this has had the effect of advancing the price from 80c. a box, which was paid last year, to \$1.25 per box.

Crackers are made principally in Canton and in the country surrounding that city. A cannon cracker factory in the suburbs of Canton is described by an eye witness as follows :

The building is of sun-dried brick, with a tiled roof twelve feet from the ground, and this space is divided into an upper and lower apartment, each with the ceiling about six feet high. The interior of the building when visited was strewn with pieces of paper, while vessels containing powder were standing round, the contents of which seemed to be in imminent danger of being exploded, and men, women and children were actively engaged in the manufacture of the goods.

The paper needed for the cracker is cut to the required length and then weighed to see that the quantity for each cracker is exactly the same. The instrument used in weighing is of the rudest description, being a stick about two and one-half feet long, suspended from the ceiling by a string, which is attached to the center of the stick, and a stone is placed as a weight on one end and the articles to be weighed on the other. The paper is rolled into cylindrical form by means of a flat piece of wood held in the hands, and then one end is creased with a pair of pinchers and a string tied into the crease as a temporary means of preventing the powder from running out when the cylinders are placed in a perpendicular position to be loaded. The last named process is as follows:

The cylinders are bunched together like cigars turned on end, and then pinched with an awl, and into the aperture thus made the powder is poured from a tin can. Then the stem of the cracker is inserted, which consists of a piece of thin, tough paper, with just sufficient powder twisted up in it to make it burn quickly. A piece of paper is temporarily pasted over the end containing the stem for the purpose of preventing the powder from running out, as the crackers are now placed on that end.

The string placed temporarily around the pinched end is now removed and clay tamping is hammered into the aperture and then the paper is removed from the stem end and the clay tamping is applied there, which prevents any powder from sifting out.

The cracker is now ready for the thin piece of red paper which goes around the outside and completes it. The stems are then very neatly braided together, which forms the crackers into packs, and these are each wrapped in thin paper and ornamented with a red label with pictures of dragons upon it. Red is the festive color of China, and as fire crackers are used principally on festal occasions, that color is rigidly adhered to in the manufacture of these goods. The packs are placed in boxes and in the proportion of forty packs to the box. There is a regular division of labor in the cracker factory, each person having his or her special work to do, and in this they become very expert. The above is a description of cannon cracker manufacture, but the same will apply to the small crackers. The latter, however, are generally made in the rural districts, and are brought down the river to Canton in junks. There is a large home consumption of fire crackers, and the Chinese think that their explosion will ward off evil spirits. They are fired off on numerous occasions, but particularly on the Chinese new year, which is a variable date regulated by the changes in the moon. Foreigners residing at Canton have what they call the Canton salute, which consists in the firing off at one time of six boxes of small crackers and two or three boxes of cannon crackers, and this is given on the departure of some one of their number for home. Of the million boxes of crackers sent each year to

A BEET sugar manufactory, with a capacity of 400 tons a day, is said to be almost completed at Grand Island, Neb. The beet has sixteen per cent of sugar, and farmers realize \$60 per acre at \$4 per ton for the root. The diffusion process of extracting the saccharine principle is used. In a fourteen-battery circuit it is claimed that the remarkable result of 99.8 per cent of the sugar can be extracted.

- -----

-----

-4 illustrations	12087
<ol> <li>MATHEMATICS.—A Table for Drawing Ellipses by Arcs of Cir- cles.—By FREDERIC R. HONEY.—The construction of false ellipses.—A table for location of the centers of curvature.—3 illus- trations.</li> </ol>	12088
V. MECHANICAL ENGINEERING.—Direct Acting Hydraulic Pumping Engine.—A nump to be driven by hydraulic pressure up a head of 1.000 feet.—For use in mines, etc.—5i llustrations 150 Ton Ice Making Plant—Linde System.—Ice making works in London, said to be the largest in the world.—Full description and illustrations.—3illustrations.	12052 12089
V1. MISCELLANEOUS.—Optical Telegraphy.—The greatest achieve- ment yet made in this art, the flashing of a message a distance of 125 miles	12097
VII. NAVAL ENGINEERINGSinking of the QuettaNotes of the loss of the ship in Torres Straits1 illustration	12095
VIII. PHARMACYThe Medicinal Uses of LeavesBy P. L. SIM- MONDSThe leaves of well known plants and their uses in medi- cineAn attractive and interesting treatment of this subject	120 <del>9</del> 9
IX. PHOTOGRAPHYDetective PhotographyBy J. C. HAN- NYNGTONA curious suggestion in the application of photo- graphy to the detection of trespassers or robbers	12102
X. TECHNOLOGYExperiments on the Preparation of Boiled Lin- seed OilBy FRANK H. THORPExhaustive and interesting ex- periments upon the treatment of linseed oil and the use of chemi-	19100
How to Hammer Circular Saws.—The difficult problem of ad-	12100
justing the tension of saws practically treated	12087
the oleomargarine question, its advantages, and misrepresentations	
which have been promulgated concerning itPresent aspect of	19005
ICK101041/11	1/0/001