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SCIENTIFIC AMERICAN SUPPLEMENT

No. 700.

For the Week Ending June 1, 1889.

Price 10 cents. For sale by all newsdealers.

THE NEW STEAMSHIP AUGUSTA VICTORIA.

The new Augusta Victoria, of the Hamburg-American steam packet line, reached this port on May 19 on her first trip, making very fast time. From Southampton to Sandy Hook her time was 7 days 2 hours and 30 minutes. This is equal to 6 days 8 hours and 30 minutes from Fastnet. The longest day's run was made on May 17—464 knots. The Cunard steamer Etruria left Queenstown a day later and arrived at the bar of New York harbor several hours behind the Augusta Victoria. On account of the greater distance traveled, the new ship went about as fast as the famous Cunarder.

The Augusta Victoria is a steel ship and was built at Stettin, Germany, by the Vulcan Shipbuilding Company. She is 460 feet long, 56 feet beam, and 38 feet depth of hold. She has three smokestacks of elliptical section, and is propelled by twin screws. Each screw is driven by a triple expansion engine; 12,500 horse power is developed by both together; 220 tons of coal are burned in a day. The two engines are independent. She carries only three masts, with fore and aft rigging. The ship is thoroughly protected by longitudinal as well as by transverse bulkheads. The longitudinal bulkhead runs from stem to stern and from keel to upper deck. The bottom is double and divided into chambers that can be filled with water and emptied at will, so as to modify the draught or trim of the ship. The rudder is of unusual size and is moved by steam. The saloons and staterooms are lighted by incandescent electric lamps. The decorations are very lavish, and the utmost luxury characterizes the saloons, music-rooms, and other divisions. The staterooms are unusually large and well provided.

On her trial trip the speed of 20 knots was attained. She was launched on December 1, 1888, and soon will have a companion in the Columbia, now approaching completion at Birkenhead, near Liverpool, England. She is of special interest from the fact that she is of German build, and her record will be watched with great interest. A short time before the Augusta Victoria was built, the Vulcan works had completed the last of the twin screw cruisers for the Chinese navy, which by their performance greatly added to their reputation.

TALK OF DISMANTLING THE FORTS.

The abandoning of most of England's fortified stations is a bold suggestion, and the leaving to means other than fortifications the coast defense of the country is a bolder one, yet both are made in all seriousness, and stoutly maintained, too, by one of her best authorities on modern warfare, Admiral Colomb, who, moreover, has a large following among military men. Of course, there is no dearth of authorities to espouse the other side, and vigorously, too, yet it is not going too far to say that the novel proposition is gaining more friends, the more it is discussed. Its effect on those considering it for the first time is a curious one, the first inclination being to ridicule it, as if it were on its very face an absurdity; a little more consideration, and the inclination is to regard it as an ingenious though a bold plan to enormously strengthen the Channel fleet, but not a practicable one. It is just here where the split comes, where various processes of reasoning lead to different goals; one following out the train of thought inspired to conviction, the other only the more sustained in his inherited belief that England's fleet should be scattered over the world.

Admiral Colomb and his *confreres* virtually ask what advantage it is to have fortified stations all over the world. For a base of supplies for the fleet? Well, then, if no fleet were kept there, no supplies would be needed, and consequently no fortifications.

A novel proposition this, and when carried to its conclusion it leaves a picture in the mind's eye of war fleets arriving in distant and hostile waters with no means of obtaining a fresh supply of coal and provisions. But the calculations that have been made show that since the introduction of steam on the sea there has not been an occasion where, during time of war, coaling stations could not be forcibly fortified. As it is, the greater part of England's fleet, often three-quarters of the number of effective ships—those out of the dockyards—are kept constantly in distant seas, and millions of dollars are spent yearly in keeping up military establishments in these far-away parts to supply them with coal and food. The best naval authorities have recently given it as their opinion that the Channel fleet should be more than equal to withstand the assault of the combined fleets of the two strongest naval powers. It never has been so, it is not so now, and, with the scattering of ships as under the present system, with the great powers constantly building, it is not likely to be so in the future.

Under the proposed system, it might be accomplished. Such a fleet might be recruited from the distant fortified coaling stations. The Admiral might have cited some well-known illustrations of the danger of dividing the forces; a notable one being the dispatch by Octavius of the best troops on a distant expedition against the barbarians while the enemy was knocking at the gates of Rome. The Admiral's idea is that, when war threatened, a dash was to be made in the direction of its probable operations, and refitting stations fortified and provisioned there, thus saving the expense of a long list of fortifications in foreign waters. As to temporary troubles in time of peace, this very steam system, which many think requires fortified coaling stations, permits the quick dispatch of an effective force.

As to the system of immense and costly shore fortifications, both he and many others of the best military minds regard them as unnecessary and ineffective. Even the iron and steel plates now being spread along their seaward faces are regarded as impotent against the assault of the great marine guns. Such fortifications make too large a target, so it is said, all that is wanted being a platform of iron or masonry, with no obstacle in the path of projectiles from the sea, and a group of deep pits to contain disappearing guns. If these and other suggestions relative to armament and processes be adopted, there will take place something like a revolution in the present system of warfare.

POSITION OF THE PLANETS IN JUNE.

JUPITER

is morning star until the 24th, and after that time evening star. On the 24th, at 2 h. P. M., he is in opposition with the sun, the most interesting epoch in his course. This superb planet is then in his best estate for terrestrial observation, being nearest to the earth, rising at sunset, and continuing visible the entire night. He wins the highest planetary honors during the month, though Venus surpasses him in brilliancy when, in the early morning hours, she appears above the horizon. Jupiter approaching opposition will richly reward observation, as he comes darting above the southeastern horizon earlier every evening and growing brighter until his culmination is reached on the 24th. His great southern declination is a drawback to the brilliancy of his appearance, and shortens the time of his stay above the horizon. Jupiter rises on the 1st at 9 h. 5 m. P. M. On the 30th, he sets at 4 h. 2 m. A. M. His diameter on the 1st is 43".8, and he is in the constellation Sagittarius.

VENUS

is morning star. She reaches her period of greatest brilliancy as morning star on the 5th at 9 h. P. M. This event occurs about 36 days after inferior conjunction, when she is about 40° west of the sun, and when about one-quarter of her illumined disk is turned toward the earth. She will be fair to see in the small hours of the June mornings as she anticipates the coming of the sun. Keen-eyed observers may follow her course after sunrise, when, shorn of her golden glow, she appears like a point of intense whiteness. Venus rises on the 1st at 2 h. 44 m. A. M. On the 30th, she rises at 1 h. 43 m. A. M. Her diameter on the 1st is 40".6, and she is in the constellation Aries.

SATURN

is evening star. He is still visible in the west, and is slowly approaching Regulus, the bright star that has been his neighbor during the winter and spring. Saturn sets on the 1st at 11 h. 29 m. P. M. On the 30th he sets at 9 h. 43 m. P. M. His diameter on the 1st is 16".4, and he is in the constellation Cancer.

MERCURY

is evening star until the 19th, and then becomes morning star. He is in inferior conjunction with the sun on the 19th, when, passing to the sun's western side, he commences his course as morning star. His conditions for observation are so exceptionally favorable that he continues to be visible on the first week of the month to the naked eye, setting on the 1st nearly an hour and three-quarters after the sun. Mercury sets on the 1st at 8 h. 55 m. P. M. On the 30th, he rises at 3 h. 43 m. A. M. His diameter on the 1st is 9".6, and he is in the constellation Gemini.

MARS

is evening star until the 17th, and then becomes morning star. He is in conjunction with the sun on the 17th, when, appearing on his western side, he commences his approach to the earth and the much looked for opposition of 1890. His progress is so slow that he will be invisible for some time to come. Mars sets on the 1st at 7 h. 41 m. P. M. On the 31st, he rises at 4 h. 11 m. A. M. His diameter on the 1st is 4", and he is in the constellation Taurus.

URANUS

is evening star. He may be found a little distance north of Spica, by the unaided eye or with the aid of an opera glass. He sets on the 1st at 1 h. 58 m. A. M. On the 30th, he sets at 12 h. 3 m. A. M. His diameter on the 1st is 3".8, and he is in the constellation Virgo.

NEPTUNE

is morning star. He rises on the 1st at 4 h. 5 m. A. M. On the 30th he rises at 2 h. 14 m. A. M. His diameter on the 1st is 2".5, and he is in the constellation Taurus.

Mars, Mercury, Neptune, and Venus are morning stars at the close of the month. Jupiter, Uranus, and Saturn are evening stars.

Caterpillars Occupy a Railway.

A correspondent of the New York *World* gives an amusing account of trouble recently experienced on a new section of railway in Maine, between Sebois and Brownville.

The advance guard was seen by a railroad timekeeper as he rode over the line on his velocipede the night before. He encountered a lot of small gray caterpillars which had spread themselves over the track so thickly that he had to push his machine along by hand for half a mile. A big engine and eleven flat cars, loaded with 1,500 ship knees, the Canadian Pacific's first train for business, started from Sebois for Brownville on the morning of May 19. It had gone but a few miles when it ran into a sticky, squirming mass, which the locomotive wheels ground to a greasy pulp that clogged the driving wheels and prevented them from getting any grip on the track. It was as if wheels and rails had been thoroughly larded. The train came to a standstill, and the conductor and engineer made an investigation.

"Pooh!" said the engineer, "bugs!"

"Ha, ha," laughed the conductor derisively.

They jumped aboard after a little scraping and tried to start again, but it was no use. The "bugs" were too much for them. As far as the eye could reach, the little caterpillars were in complete possession of the track. The Canadian Pacific was turned into two lines of gray wriggle. The train was in the midst of the woods.

"Cut bushes and try to sweep them off," said the conductor to the train men. All hands tried it, but the bushes crushed the pulpy mass and only smeared the track worse than ever. Sand was then sprinkled on the rails. This enabled the engine to start, but the caterpillars soon greased the ties again and the train halted. A messenger was dispatched to the Sebois station, and the situation telegraphed to the manager of the road. He sent an extra locomotive and a crew of helpers to the assistance of the beleaguered train. With a force of men scraping and sanding, with an engine to pull and another to push, the train crept through the woods at a snail's pace.

And now, queerly enough, a new enemy rallied to the support of the caterpillars. A vast horde of large and ferocious mosquitoes came out of the depths of the forest and assailed the motley crew of railroad men, showing no national predilections, but drawing blood from Poles, Frenchmen, Russians and Irishmen alike. Even a bishop would have smiled to see the crowd fighting mosquitoes with one hand and caterpillars with the other, all the time swearing in at least five different languages! Supt. Van Zile issued the orders, and charge after charge was made at the steep grades lubricated with squeezed caterpillars. All day long and after the sun had gone down, the locomotives and men toiled to drag that train from Sebois to Brownville. The myriads of caterpillars covered the rails for eleven miles. When the train reached its destination at last it bore the most exhausted and disgusted crew ever seen outside of a blizzard.

The Value of an Idea.

The value of little inventions has had a singular proof or manifestation lately in the great run on "pigs in clover," a puzzle that has, we venture to say, been seen by nearly all our readers, for it has already made its way everywhere. Mr. C. M. Crandall, the inventor of this toy, says that for twenty years past he has had his mind on the availability of the rolling of marbles for a toy, and that in his model room the first experiment with the "pigs" took the form of a table, two feet in diameter, on a ball and socket joint. This was soon reduced to the hand toy now so familiar, of which 300 gross have been turned out daily for some time, while the demand has not yet been met by the supply. Mr. Crandall is a prolific inventor of toys, but it will be noted that it was twenty years before he evolved this last popular novelty in practical form. His perseverance and his success should give encouragement to other inventors, many of whom are at this very moment working upon new ideas of at least equal worth and utility. In the field of electricity alone, there is room for scores of Crandalls, who in some way or other are to hit the needs and fancies of the public. One does not look for the invention of such great novelties as the telegraph, the telephone, the electric light, and the electric motor every day of the week; but electrical improvements and devices, as trivial and as valuable as "pigs in clover," may be arrived at endlessly, and are not to be despised.—*The Electrical World.*

Rock Drills and Compressors.

The Rand Drill Company, of New York City, in their catalogue for 1889, have succeeded in giving a large amount of information relative to the drilling and excavation of ore and rock by machinery. It has many interesting and valuable illustrations of important engineering works, as well as those more particularly showing the operation of drills and compressors, with details of the tools and machinery employed. It is a large octavo of 195 pages, and is sent free to all who ask for it.

The First Electrical Execution.

The purchase of three dynamos and other appliances for our New York State prisons inaugurates the planning for the first execution by electricity, and William Kemmler, of Buffalo, may claim the distinction of being the first person ever sentenced to be thus executed.

The sentence was pronounced by Judge Childs in these words: "The sentence of the court is that for the crime of murder in the first degree, whereof you stand convicted, within the week commencing on Monday, the 24th day of June, 1889, and within the walls of Auburn State prison, or within the yard or inclosure adjoining thereto, you suffer the punishment of death, to be inflicted by the application of electricity as provided by the Code of Criminal Procedure of the State of New York, and that in the mean time you be removed to and, until the infliction of such punishment, be kept in solitary confinement in said Auburn State prison."

The death warrant in the case is directed to the warden of Auburn prison, and provides that the sentence be executed "upon some day within the week commencing Monday, the 24th day of June, in the year of our Lord 1889, and within the walls of Auburn State prison, or within the yard or inclosure adjoining thereto, by then and there causing to pass through the body of him, the said William Kemmler, a current of electricity of sufficient intensity to cause death, and that the application of such current of electricity be continued until said William Kemmler be dead."

The result of this novel method of execution of criminals will be watched with interest from all parts of the world.

Interesting Scientific Exhibits.

At the recent conversazione of the Royal Society at Burlington House, given by Professor G. G. Stokes, M.A., president, among the scientific objects of interest exhibited was a new adjunct to the optical lantern, invented by Mr. Eric S. Bruce, and called by him the "electro-graphoscope." It consisted of a white lath about an inch wide and 18 in. long, which was made to rotate windmill fashion by an electro-magnetic motor; a picture then thrown on the rotating lath by the magic lantern was visible in its entirety, on the principle of the retention of vision; the background some distance behind the lath was also visible, hence the picture cast by the lantern, which was one representing a statue, seemed to stand out in midair.

Mr. A. W. Clayden exhibited a shallow vessel containing water, with projecting flat horizontal pieces of zinc shaped to represent Europe and America, while the water represented the oceans. Then, by means of a dozen or more small pipes, jets of air were blown over the water in such a manner that all the trade and other regular winds were thus represented; the result was that the surface of the water took up motions representing the Gulf Stream, the cold current flowing down the coast of Labrador, and that other actual oceanic currents were imitated.

In an experiment shown by Mr. Shelford Bidwell, a bar of iron, which has undergone certain preliminary treatment, is placed close to a small reflecting magnetometer. When the iron is illuminated by an oxy-hydrogen lamp, it instantly deflects the magnetometer needle, as is evidenced by the movement of the spot of light upon the scale; and when the illumination is cut off, the spot of light at once goes back. The preparation of the iron consists in first magnetizing it by a current of electricity passed through a surrounding coil, and then very perfectly demagnetizing it by a reversed current of suitable strength. Its magnetic condition is thus rendered unstable, and its susceptibility appears to be greater for a small magnetizing force acting in the same direction as that by which the bar was at first magnetized than for an equal small force in the opposite direction. In the experiment the end of the iron rod was about half an inch from the end of the suspended magnetometer needle; the bar of iron was 6 in. long and ½ in. in diameter. The whole of the bar was illuminated to produce the deflection. The instrument was so sensitive that it was affected by the iron in the wheels of cabs moving in the court yard outside; the disturbance was not due to the vibrations of the ground set up by the cabs.

Mr. J. W. Swan exhibited a Gramme ring, rotating under the influence of the magnetism of the earth. Within a shallow circular brass box, about five inches in diameter, twenty little coils of insulated wire were disposed near the circumference; each coil consisted of 400 turns of wire, making 8,000 turns altogether. The resistance of the coil when the current was split was forty or fifty ohms, the current passing in the ring was about half an ampere. This ring was free to turn on a vertical pivot, and continued to turn steadily, under the influence of the magnetism of the earth.

Mr. H. Brereton Baker performed some curious experiments, as follows, on non-combustion in dried oxygen: 1. Charcoal was heated to redness in dried oxygen without any visible combustion. The oxygen had been in contact with the drying agent for two months. 2. Sulphur was distilled in oxygen dried by phosphorus pentoxide for five years; no flame was seen. In moist oxygen, sulphur burns at a temperature of 320°; its boiling point is 440°. 3. Phosphorus was distilled in oxygen dried in the same way; it boils at 290°. In moist oxygen it catches fire at about 60°. 4. Ordinary phosphorus, he said, is not luminous at any pressure in dried oxygen.

Captain H. Capel L. Holden exhibited a chronograph for measuring the velocity of projectiles and small periods of time. Mr. William Crookes exhibited a great photographic map of the solar spectrum, taken by means of a Rowland's grating. Mr. C. V. Boys exhibited some useful applications of fibers of quartz. Professor J. W. Judd exhibited specimens of Egyptian blue recently made by Professor Fouque, who discovered the ancient coloring matter to consist chiefly of silicate of lime and silicate of copper. Mr. Killingworth Hedges exhibited an automatic safety device for use in connection with electric light circuits when alternating current transformers are employed.

Aphasia and Apraxia.

In an extremely interesting paper read before the New York Academy of Medicine, Dr. M. Allen Starr enters fully into the varieties of aphasia and apraxia, and gives valuable practical directions for the examination of persons presenting these symptoms.

To examine an aphasic thoroughly it is necessary to test:

1st. The power to recall the spoken or written name of objects seen, heard, handled, tasted, or smelt.

2d. The power to understand speech and musical tunes.

3d. The power to understand printed or written words.

4th. The power to speak voluntarily. Does he talk clearly? Does he mispronounce words? Does he misplace words? Does he talk jargon?

5th. The power to repeat a word after another.

6th. The power to read aloud. Does he understand what he reads?

7th. The power to write voluntarily. Can he read what he has written?

8th. The power to write at dictation.

9th. The power to copy.

10th. The power to recognize the use of objects seen, heard, felt, tasted, or smelt.

By apraxia is meant the inability to recognize the use or import of an object, and it includes the conditions first described as blindness of mind and deafness of mind. The variety known as blindness of mind is that most commonly found. The first example of its successful treatment by operation is recorded by MacEwen, of Glasgow, in the *British Medical Journal* for August 11, 1888. A man who had received an injury a year previously to his applying for treatment suffered from deep melancholy and strong homicidal tendencies, which were relieved by paroxysms of pain in the head. There were no motor phenomena, but it was discovered that immediately after the accident, and for two weeks subsequently, he had suffered from psychical blindness.

Physically he could see, but what he saw conveyed no impression to his mind. An object presented itself before him, which he could not make out; but when this object emitted sounds of the human voice, he at once recognized it to be a man. In attempting to read he saw what he considered must be letters and words, but they were unknown symbols to him; they conveyed no impression of their meaning; the memory of their signs was gone; it was a sealed book to him. These phenomena gave the key to the hidden lesion in the brain. On operation the angular gyrus was exposed, and it was found that a portion of the internal table of the skull had been detached from the outer and had exercised pressure on the posterior portion of the supra-marginal convolutions, while a corner of it had penetrated and lay embedded in the anterior portion of the angular gyrus. Removal of the bone resulted in complete recovery from the pain and mental symptoms.

The variety of apraxia known as deafness of mind has recently been studied by Oppenheim ("Charite Annalen, XIII., 1888), of Berlin, who noticed that while some aphasics retain their musical faculties, others may lose the power to follow melodies, to appreciate music, or to hear or sing the tunes which they formerly knew.

To test for apraxia it is only necessary to present various objects to a person in various ways and notice whether he gives evidence of recognition. Aphasia occurs without apraxia, but apraxia cannot occur except in connection with some form of aphasia.—*Medical Record.*

The Eastward Ocean Record Broken.

The City of Paris left New York on May 15 and reached Queenstown in 6 days and 29 minutes. This beats the Etruria's best eastward passage of 6 days 4 hours and 40 minutes and the Umbria's best eastward passage of 6 days 2 hours and 22 minutes. Up to the present time these had stood as records unequaled by any other ship. The City of Paris now heads the list for speed both eastward and westward. Her longest day's run on this last voyage was 476 knots.