

the forward propeller in each case having a slightly less pitch than the after propeller.

In the accompanying illustration, which represents one of the complete sets of engines, the low-pressure and reversing turbines are shown coupled upon one shaft, and the high-pressure turbine upon the other. One valuable feature of this system of propulsion is that the thrust of the propellers is entirely balanced by the pressure of the steam upon the turbines, so that there is no necessity for the usual thrust-block bearing, and the large amount of friction due to the thrust block is thus avoided.

The total weight of the engines, with their auxiliary gear and the water in the condensers, is about 60 tons, which works out at about 183 horse power to the ton when the engines are working up to their maximum power. This remarkably good showing is offset, however, by the greater weights in the boiler rooms which are necessary to meet the demands for the necessary large supply of steam. The turbines proper, with their foundations, are of course extremely light for the horsepower developed when compared with engines and their foundations of the reciprocating type. The increased size of the auxiliary machinery and the condensers due to the larger boilers serves to bring the total engine and boiler room weights nearer than would be expected to those necessary for engines of standard design. Undoubtedly the greatest advantage of the turbine-propelled torpedo boat is the remarkable steadiness due to the absence of reciprocating parts. Reports of the trial state that when the vessel was making a speed of over 40 land miles per hour there was an absolute absence of vibration. This is an important feature, both in respect of the steady gun-platform which is thus provided and of the increased comfort of the officers and crew. The latter consideration is one, the importance of which can only be understood by those who have to endure the very real hardships of torpedo-boat service.

#### The Finding of the South Magnetic Pole.

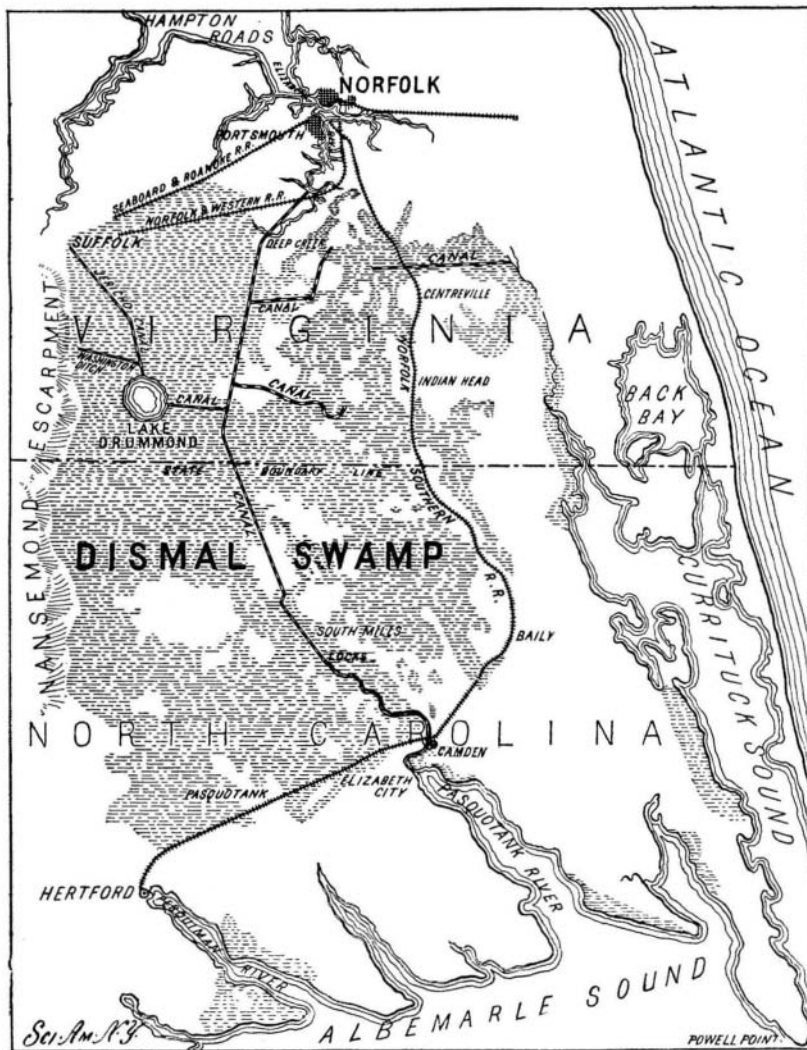
The steamer "Southern Cross," with C. E. Borchgrevink and the survivors of the South Polar expedition, which was fitted out in 1898 by Sir George Newnes, has arrived at Wellington, New Zealand. Herr Borchgrevink reports that the magnetic pole has been located. "The key to the future knowledge of terrestrial magnetism lies in the determination of the exact position of the southern magnetic pole," remarked Sir Joseph Hooker, several years ago. The work of Sir James Ross, who, early in 1841, sought a harbor in Victoria Land with a view to spending the winter there and planting his flag on the south magnetic pole the next summer, will be remembered. He did not, however, succeed in reaching it, and the nearest he came to it was off Mount Erebus. Sir John Ross discovered the position of the North Pole some sixty-seven years ago, and the knowledge of the exact position of the north and south magnetic poles will set at rest the question which is still much in dispute among scientific men, as to whether their position is fixed or variable, and if these poles are not stationary the comparison of their position at various times will show the direction and rate of their motion, which will enable the scientists who are interested in terrestrial magnetism to find the law governing the changes in magnetic declination, inclination and intensity. Accounts which have come to hand at present are very meager, but if the expedition has done nothing more than discover the south magnetic pole, it has many times paid for itself from a scientific point of view.

With the completion of the extension of the Dresden tramways now in hand there will be about 70 miles of line worked by electricity. A new generating station is being erected at a cost of \$1,300,000. In the new station there will be installed five steam sets of 1,000 horse power each, while a further addition of two such sets will be made to the original plant, together with the additional boiler power rendered necessary. The tramways at Dresden, says The English Electrical Engineer, are in the hands of two distinct companies, which pur-

chase the necessary current for working their lines from the corporation, the method of charging being an interesting one.



JERICHO DITCH, GREAT DISMAL SWAMP, VIRGINIA.



THE DISMAL SWAMP CANAL.



LAKE DRUMMOND, GREAT DISMAL SWAMP, SHOWING THE LIVING TREES PROJECTING ABOVE THE WATER.

#### THE DISMAL SWAMP OF VIRGINIA.

The Dismal Swamp of Virginia and North Carolina is one of the most curious features of the North American continent, and it is one of the least known sections of the country. It is a great fresh water morass lying back from the sea, between Norfolk and Albemarle Sound. It belongs to that group of inundated lands where the lack of drainage is due to an original deficiency of slope combined with the retarding influence of vegetation on the movement of the water from the land. The coast from New York southwest has the form of an ancient sea-bottom, more or less modified by river action. From the James River southwest the elevations of the plain are still further lowered, the incisive action of the streams have yet further reduced it, leaving parts of the surface in the form originally belonging to the sea bottom. This plain is sharply bounded to the west by an escarpment formed by the sea when the surface of the continent was about 28 feet below its present level. This old sea-bench, to which Dr. Shaler, in his interesting account of fresh water morasses in the United States, published in the Tenth Annual Report of the Geological Survey, gives the name of the "Nasemond Shore Line," extends from near Suffolk, Va., where it is rather obscurely indicated, having been somewhat effaced by erosion, southward, with extreme distinctness of the front to Albemarle Sound. The eastern boundary of the swamp district is determined by certain low elevations, apparently dune-like in their nature. In its original condition before its origin had been effected by tillage, the area was considerably greater than it is at the present time. The pro-

cesses of artificial drainage, of course, resulted in the reclamation of a large area, and the upper portion of this geological drainage work was finished before the middle of the present century. In the last century the Dismal Swamp Canal Company constructed a canal in a general western and southern direction from the waters of the James River to the waters of the Albemarle Sound near South Mills, N. C., and in the SCIENTIFIC AMERICAN for March 5, 1898, will be found a description of the recent increase in the size of this canal. The result of this interference with the natural drainage of the swamp has been that the western section of the morass is probably more flooded than it was before the barrier was constructed, while the section to the east of the canal, deprived of water which originally flowed into it, has become partially desiccated.

Probably the most interesting feature in the topography of the Dismal Swamp is the presence of a large lake, toward the western end of the swamp. Its origin has not been definitely determined by physical geographers. Dr. Shaler is of the opinion that it was formed in the following way: The generally sloping platform on which the Dismal Swamp rests, evidently emerged from the sea in a somewhat rapid manner. The absence of any marine bench on its surface appears to be conclusive evidence of this.

First, we may assume that the sterile character of the soil would have prevented the growth of forest trees and other plants of a higher order over the greater part of the plain. The growth of such plants would naturally have begun on the periphery of the district, either on the western border, where the soil had already been formed, or next to the sea, where the humidity would favor the growth of plants, even on barren sand. The forest then probably advanced toward the center of the field and the falling trees and other entanglements would serve to form an obstruction to the outflow of water, and thus to retain the central part or area in the condition of a shallow lake. The area of this basin will be gradually narrowed by the growth of cypresses, black gum, and other trees which can maintain their roots below the level of permanent water. The level of the water in Lake Drummond has been raised until since the construction of the canal and the forest is still gaining upon the lake at several points.

If Dr. Shaler's views are accepted, Lake Drummond must be considered as belonging to the type of enclosed lakes, which are so common in the small morasses of glacial areas. The vegetation exhibits a great diversity over the

entire area of the swamp, which is estimated at between 800 and 1,000 square miles. The principal trees are those which are tolerant of water about their roots. These are the bald cypress, juniper and black gum. There are also canes and mosses in great variety.

The reputation of Dismal Swamp is that of a gloomy and impenetrable region, filled with fever and malaria, and infested with snakes and noxious animals.

John Boyle O'Reilly, who spent some time in exploring the swamp, says: "The Dismal Swamp is an agony of perverted nature. It is Andromeda, not waiting for the monster, but already in its grasp, broken and silent under the intolerable embrace."

The lake was discovered in 1775, by a Scotchman named Drummond, and after the Revolution, George Washington purchased the swamp and organized the Dismal Swamp Company, which still exists. It was Washington's idea to reclaim the swamp, and for this reason he cut the canal described herein.

There are a large number of species of animal life in the swamp, bears being abundant. Deer are now rare, but are still occasionally shot, and wild horned cattle are found within the limits of the swamp. These cattle feed upon the tenderer shoots of the canes, and dwell in considerable herds. Bird life is abundant, and the number of serpents is extraordinary at certain seasons of the year. Various ditches have been dug for draining the canal, and at present access is obtained to Lake Drummond by Jericho Ditch, 12 miles long, 15 feet wide and 3 feet deep. The first section of the swamp is comparatively open, having been burnt off. Gradually the cane brake becomes thicker and the reedy growth resembles bamboo or papyrus, the banks of the ditch are for the most part very marshy; the growth of young canes, holly and mistletoe is notable. The water is of a deep sherry color, and, strange to say, it is said to be healthy to drink, probably owing to the infusion of juniper. The "Black Gum Swamp," two miles from Lake Drummond, is most impressive, the trees being tall and set close together.

#### Paris Exposition Notes.

Those who are familiar with Exposition work state that the Paris Exposition will not be in full working order until June 15, although it will probably be sufficiently advanced one month from the opening, namely, May 14, to satisfy visitors.

Arrangements, for admission to the Paris Exposition have now been made. Tickets will cost one franc each, and may be purchased in many places all over Paris. Between the hours of eight and ten in the morning two tickets will be required for admission, and from ten to six one ticket only will be required, but after six o'clock two tickets must be presented. When there are spectacles or exceptional attractions three to five tickets will be required.

The American Section will, so far as possible, be closed on Sunday. Considerable effort was required to obtain this concession. A by-law compels the opening of all the exhibits on the seven days of the week, and even gives the French authorities power to remove the coverings over the exhibits. The same rule applies to machinery. The Director-General of the Exposition has, however, given special permission to close the American Pavilion on Sunday.

There is an evidence of a great advance in prices during the Exposition, both in hotels and pensions. First-class accommodations within a reasonable distance from the Exposition are going to be very expensive. An ordinary boarding house which usually charges seven francs a day has now made arrangements to charge thirty francs. Those who are to spend some weeks at the Exposition will do much better by living a short distance outside of Paris. The railroad communications are excellent and trains will be run directly to the entrances. In fact, it is a question if it will not be more comfortable to live in this way than to use the crowded means of communication in the city proper. The scarcity of cabs and carriages will be very great and the omnibus and tramways are allowed to carry only a certain designated number of passengers.

The regulations under which photographers may pursue their pastime within the precincts of the Exposition have, at last, been formulated. The use of hand cameras will be permitted at all times, free of charge or restriction, but the use of apparatus standing on a tripod will be allowed only up to one o'clock. In addition, photographers of this class must obtain written permission from the Commissioner General and pay the tax, which has been fixed at five francs for one day or two hundred for the period of the Exposition. No exhibit may be photographed without the written authorization of the exhibitor and the interested persons must also obtain from the foreign Commissioner-General or Concessionaries, authorization to reproduce their palaces or pavilions. They assume all responsibility for reproductions they may make and guarantee the Administrator of the Exhibition against all claims. These rules are certainly wise and liberal and are in a marked distinction to the unfortunate conditions of affairs at our own Exhibition in 1893.

#### Solidification of Hydrogen Gas.

A year ago Prof. Dewar liquefied hydrogen; he has now gone a step further and produced hydrogen as a solid. In an interesting series of experiments made before an audience at the Royal Institution on April 6, he showed how the gas could be solidified. He surrounded the tube containing it with liquid air to prevent the increase of heat and then applying a powerful air pump to the liquid hydrogen he transformed it into a white opaque solid. The New York Sun, which cabled over an account of the experiments, says that in discussing the question of the utility of solid hydrogen in scientific research, Prof. Dewar said that the mere fact that its transformation from gas is interesting because it is the elementary body of the lowest atomic weight. One of its uses was in the solidification of oxygen, and it could also be used in the separation of mixed gases.

#### THE NEW ASSISTANT COMMISSIONER OF PATENTS.

As we announced two weeks ago, Walter H. Chamberlin, Esq., of Chicago, was nominated as Assistant Commissioner of Patents to succeed Arthur W. Greeley, Esq., who resigned. There were many aspirants for the position, but the matter of a successor to Mr. Greeley was left to Commissioner Duell, the President considering that in view of the intimate relationship between the offices the head should be consulted. Mr. Chamberlin was well known to Commissioner Duell, and he was satisfied of the latter's fitness for the position.

The new Assistant Commissioner was born February 9, 1866, at Detroit, Mich. He selected law as a profession and was taken into the office of the late Wells W. Leggett, a son of the former Commissioner of Patents, and a recognized attorney in the patent world. After graduating from the law course he was admitted to the



ASSISTANT COMMISSIONER OF PATENTS  
WALTER H. CHAMBERLIN.

bar in Chicago in 1890 and at once began the practice of his profession. He continued in practice up to the present time, making patent law a specialty. He was endorsed for the position which he now holds by the leading patent lawyers of Chicago and elsewhere. Mr. Chamberlin favored the appointment of Mr. Duell as Commissioner of Patents in 1897, and both he and the Commissioner have been warm friends for some years, and the Commissioner considers that his new assistant will be very helpful to him for carrying out the policy which he had adopted. Mr. Chamberlin has already entered upon his new duties. We wish him every success in his new office.

#### Remarkable Metallurgical Experiments.

Some interesting experiments were carried on in the laboratory of Mr. T. A. Edison, at Orange, N. J., on April 7, by the agent of a German chemical concern who exhibited a new process of attaining great heat in an almost incredibly short time by the combustion of a secret chemical compound used in connection with powdered aluminium. A cupful of the chemical was placed in a crucible, a small amount of powdered aluminium was added, and then a wrench about half an inch thick and six inches long, was placed in the crucible. A match was touched to the compound and violent combustion took place. It is estimated that the temperature was not far from 3000° C. At first sight these statements seemed almost impossible, but Mr. Edison writes us, "The process works well."

#### The Rotation of Venus.

A telegram has been received at the Harvard College Observatory from Prof. Kreutz, at Kiel, stating that he has information from Prof. Backlund, Director of the Observatory at Pulkowa, Russia, that, from an examination of spectrograms, Belopolsky has found the time of rotation of Venus to be short.

#### Automobile News.

Steam omnibuses are used to a considerable extent in Algeria.

The Acting Secretary of the Treasury has ruled that an automobile is not free of duty as a personal effect, but is free of duty as a household effect if used abroad by the owner one year or more.

An interesting use of the motor carriage is in delivering newspapers in long, straggling country districts, where it has proved invaluable. Two of the London journals have tried the plan with great success.

Horseless carriages proved very successful in Boston, during the heavy snows of last winter, the only difficulty was after the snow began to melt, the drifts near the curb making it troublesome getting near to and away from the sidewalks.

The Automobile Club of America has issued a pamphlet of fifty-six pages in the interest of good road agitation. It contains a list of officers of the club and the various addresses delivered before that body. The pamphlet is almost entirely devoted to the improvement of the highways of the State of New York.

The Paris Exposition authorities have appropriated 100,000 francs toward the expense of the automobile section. This will be some 30,000 francs short of the estimated deficit. The Automobile Club of France has agreed to carry out the programme practically in its original form.

The principal factor of agitation in Tokio at present is street railways; applications have been sent in for permission to put down about 200 miles in all in the city. The system proposed is electrical. Whether the scheme will get beyond the regions of talk or not in the very near future is more than one can say. The proposed cost of installation is 15,000,000 yen. The French have shown a good deal of enterprise in trying to introduce French-made vehicles in Japan. About a year ago a Frenchman brought a motor street carriage to Tokio; after showing it off in the streets of the city for about a month or so, and finding no purchaser, he suddenly packed it up and took it back to France. This gentleman is now in Tokio again with a "Serpellet" street railway car, and has shown what can be done with it. The local papers speak well of the machine, but I expect nothing but electricity will find favor with the city authorities.

The new automobile service in the Soudan, between Kayes and Bamako, on the Niger, has been recently inaugurated, and a communication from Kayes, dated the third of February, states that Governor Chaudié had just returned from a voyage in which he had laid out certain new territory, and in the course of which he inaugurated the new automobile system for the transportation of passengers and merchandise between these two points. The governor and party left from Bamako on the 22d of January and arrived in two days at Kiti, making about 90 kilometers per day on a six hours' run. From this point he passed to Toukouto, and finally arrived at Kayes on the 27th of January, the whole trip taking thus about five days. Upon his arrival the governor expressed himself as greatly pleased with the rapidity and facility of the new system, and recalls the fact that on a former trip to the Niger it required fifteen days to cover the same route. By this system the Senegal is brought into connection with the Niger, the district passed through being one which had not been reached heretofore by water or by railroad, on account of the rapids of the Senegal and the mountainous mass called Fouta-Djalon, which separates the Senegal from the Niger. The automobiles for this system were constructed by a Paris firm, and were installed under the direction of M. Felix Dubois.

#### The Current Supplement.

The current SUPPLEMENT, No. 1268, is opened by an article on the Pan-American Exposition, accompanied by engravings of a number of views in the grounds and also of the buildings. "Power Consumption and Comparative Costs of the Automobile Delivery Wagons," is by Prof. George F. Sever. "Educational Values," is by Prof. W. Le Conte Stevens. "One Hundred Years of Achievement of American Glass Manufacture," is by C. A. Tatum. "The Neolithic Epoch in Ancient Egypt," is an interesting and fully illustrated article. "Earthquake-Sounds," is by Charles Davison.

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