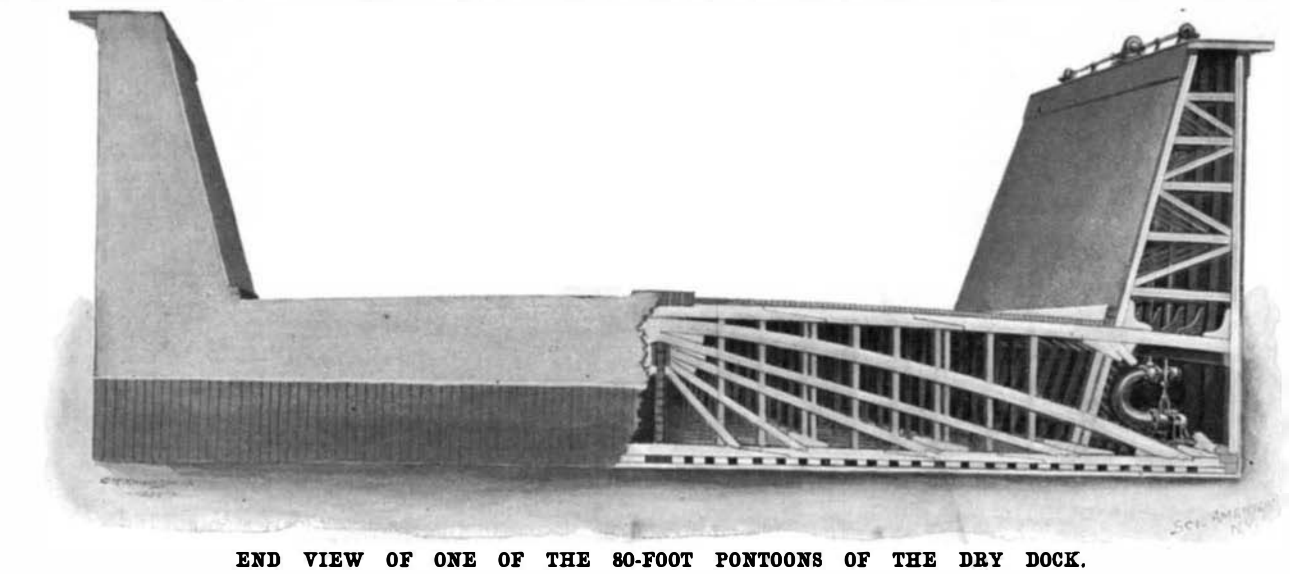
700-FOOT FLOATING DOCK AT SOUTH BROOKLYN.

The port of New York has hitherto been severely handicapped by the lack of proper dry dock facilities for vessels of the larger class. It is well known that the fleet of mail steamers which plies between the old and the new world includes the very largest vessels afloat; and while they start and arrive at a great many different ports in the old world, practically the whole of the fleet makes New York its destination on this side of the Atlantic. Whenever disaster has overtaken one of these big ships on its westward passage it has been necessary for it to go to some other port than New York for dry-dock repairs. It is satisfactory to know, however, that all this is being changed by the construction of a large floating dry dock which will be located conveniently to the new 40-foot channel which is being dredged along the Brooklyn foreshore. This dock, which is to have an extreme length of 700 feet, will be capable of accommodating the largest vessel afloat, and one of our illustrations on the front page shows the "Oceanic," which has an over-all length of 704 feet, comfortably accommodated in the big structure.



END VIEW OF ONE OF THE 80-FOOT PONTOONS OF THE DRY DOCK.

The dry dock is merely one feature in an extensive and thoroughly up-to-date ship repair yard which is now being laid out and constructed by the Morse Dry Dock Company at South Brooklyn. The property is situated between Fifth-fifth and Fifty-eighth Streets, and backs on First Avenue, along which it extends for a distance of 426 feet. In addition to the floating dry docks there will be a wet dock or basin, the inner end of which will be about 100 yards from First Avenue, while the two piers which inclose it will extend out 1,400 feet to the edge of the new government 40-foot channel. The first 700 feet of the basin will be about 37 feet wide with a depth of 25 feet, and here vessels with a moderate draught of water will be berthed in the proximity of the machine shop. The outer 700 feet of the channel will be 100 feet wide and will have a clear depth of 35 feet, or sufficient to accommodate the largest ocean liners. The pier to the south will be 22 feet in width, and that to the north 30 feet in width. On the north side of the latter pier will be the dry-dock basin, which will have a clear width of 130 feet and a depth of water at the entrance of 35 feet, while the length of this basin will be just 1,000 feet. The pier on the north side of this basin will also be 30 feet in width. The frontage of all three piers will aggregate 4,000 feet and each pier will be traversed by a railroad which will run through the repair and boiler shops, and also have connection with other points in the yard. At about the mid-length of the southerly pier there will be a large coal pocket for the accommodation of the ships which visit the basin. Immediately to the east of the dry-dock basin will be a boiler shop, and beyond this a large two-story machine and repair shop, the width of each of these buildings being 80 feet, and their combined length 600 feet.

The object of most popular interest is naturally the large pontoon dry dock. This huge structure is not built, as might be supposed, as one integral structure, continuous throughout, but is composed of seven separate sections, which are identical in every respect. Each section is built of an approximate U-form. The body of the pontoon is 120 feet wide, with a maximum depth of 15½ feet at the center. On each side are two tall wings, each measuring 56 feet from the bottom of the pontoon to the top platform, on which are located the motors for operating the electric pumps and handwheels for opening and closing the inlet valves. Each section is 80 feet in length, and, as there is a 36-foot extension of the floor of the two end sections, and a space of about 4 feet is allowed between the adjoining sections, it will be seen that the total over-all length of the dock is approximately 700 feet. The illustration showing an end view of one of the pontoons is self-explanatory. The dock is built of the best Southern pine, and a very complete system of stiffening bulkheads is used, there being seven running longitudinally, or fore and aft through each pontoon.

Each section is provided with a number of inlet gates below the water line, and it carries sufficient ballast to insure its sinking when the gates are opened. On the floor of each wing are located two centrifugal pumps, each pair driven by a 50-horse power electrical motor, which is located on the working platform above. These pumps have a capacity of between 5,000 and 6,000 gallons of water per minute, and it is expected that they will be capable of lifting a ship in from 30 to 45 minutes. The lifting capacity of each pontoon is 2,500 tons; consequently, the combined lifting capacity of the whole dock, when coupled up, will be 17,500 tons.

In docking a ship like the "Oceanic," the inlet gates will be opened and the pontoon sunk to a depth which will allow the big vessel to be backed in between the wings, with the necessary clearance between her keel and the keel blocks. As soon as everything is in position, the fourteen electrical pumps on the upper platforms will be started simultaneously from a controlling switchboard, which is located at the inner end of the dry-dock basin. As the water is pumped out the pontoons will rise, lifting the vessel until she is clear of the water, as shown in our front-page illustration. The bulk of the weight, of course, will rest upon the keel blocks, and it is interesting to note in our detailed view of the pontoon how this enormous concentration of load is distributed across the full length of the floor by means of massive 10×10 timber struts, which radiate from the top of the center-line bulkhead to the foot of the immediate bulkheads on either side. The timbers or "shores" which are shown reaching from the side of the vessel to the inner wall of the wings do not, of course, carry the load, but merely keep the ship on an even keel. One advantage of the pontoon method of building these docks is that only so much of the dock need be used as is desired. A vessel that was only 150 feet long would simply require the pumping out of the first two sections. The wet dock, as the adjoining basin is called, will be used simply for the reception of such vessels as needs repairs, but do not require docking. For the conveyance of material between the shops and the vessels under repair there will be two locomotive cranes and several freight cars. The cranes will be capable of lifting machinery and other heavy weights from the ships and carrying them to whatever part of the yard is desired, or vice versa.

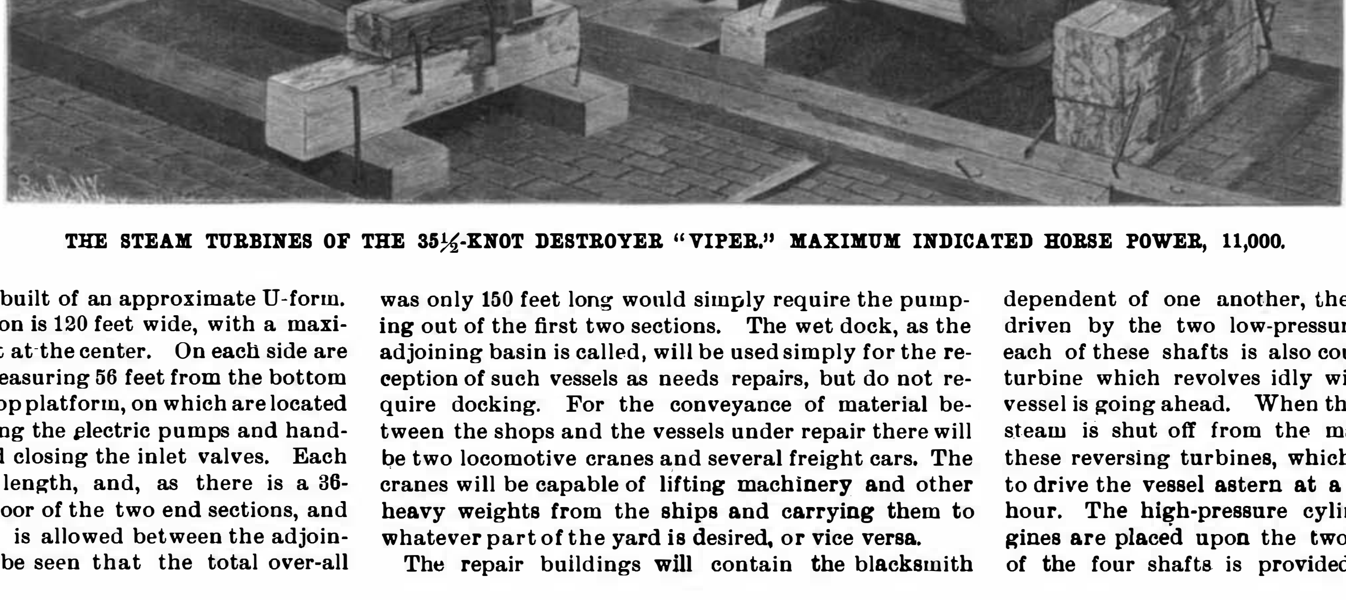
The repair buildings will contain the blacksmith shop, boiler shop, machine shop, and various other departments required in a modern plant of this kind. The machinery will be in every way up to date. Electric power will be extensively employed, most of the machines being run by direct-connected motors, and extensive use will be made of compressed air, not only in the shop, but throughout the yard. For the latter service lines of compressed air mains will be carried down the full length of each pier, with valves at every 75 feet, to which flexible hose can be attached for work upon the ships themselves. This compressed air will be used for caulking, riveting, chipping, drilling, and the other operations incidental to ship repairs.

The company estimates that it will be able to accommodate about twenty-five ships, big and little, at one time in the dry-dock and the adjoining basins.

It will interest our readers to know that the dry-dock basin was given an extreme length of 1,000 feet, or over 300 feet more than the present length of the dry dock, in order to allow for the addition of three or four more pontoons if they should be rendered necessary by the future increase in the length of ocean steamers. The company anticipates that in view of the proved advantages of size, it will not be many years before a vessel of 1,000 feet length will enter the port of New York.

THE ENGINES OF THE TORPEDO BOAT DESTROYER "VIPER."

The torpedo boat destroyer "Viper" is one of a large number of vessels of the destroyer type built for the British Navy, which are identical in everything except the engines. In all but one of these vessels the engines are of the standard, reciprocating type, but the "Viper," was equipped with Parsons' turbines of the kind which won much distinction in the world-renowned experimental vessel "Turbinia." The figures given in the official tables of the British torpedo fleet show that the "Viper" was to make 31 knots with 6,500 horse power, and 35 knots with 10,000 horse power. The principle dimensions of the boat are as follows: length 210 feet, beam 21 feet, draught 7 feet, molded depth 12 feet 9 inches, and displacement 350 tons. On her recent official trial the "Viper" attained a speed of 35½ knots with 11,000 indicated horse power. The engines of the reciprocating type indicate about 9,000 horse power when driving a destroyer of about the same size as the "Viper" at 32 knots an hour. Although speeds of 32 to 35 knots an hour are reputed to have been obtained by the torpedo boats with reciprocating engines built for the Chinese government by Schichau, of Elbing, Germany, these craft are so much smaller that no satisfactory comparison of horse-power developed for a given speed can be made between these vessels and the turbine-propelled destroyer.



THE STEAM TURBINES OF THE 35½-KNOT DESTROYER "VIPER." MAXIMUM INDICATED HORSE POWER, 11,000.

The "Viper" was constructed by the Parsons Marine Steam Turbine Company, of Wallsend-on-Tyne, the turbines being built at the same works. The power is developed on four shafts, two on each side of the center-line of the vessel. The engines are in duplicate and consist of two distinct sets, one being placed on each side of the center-line of the vessel. Of the four propeller shafts, which are quite independent of one another, the two inner shafts are driven by the two low-pressure turbines, and upon each of these shafts is also coupled a small reversing turbine which revolves idly with the shaft when the vessel is going ahead. When the vessel is going astern, steam is shut off from the main engines and fed to these reversing turbines, which have sufficient power to drive the vessel astern at a speed of 15 knots an hour. The high-pressure cylinders of the two engines are placed upon the two outside shafts. Each of the four shafts is provided with two propellers, the forward propeller in each case having a slightly less pitch than the after propeller.

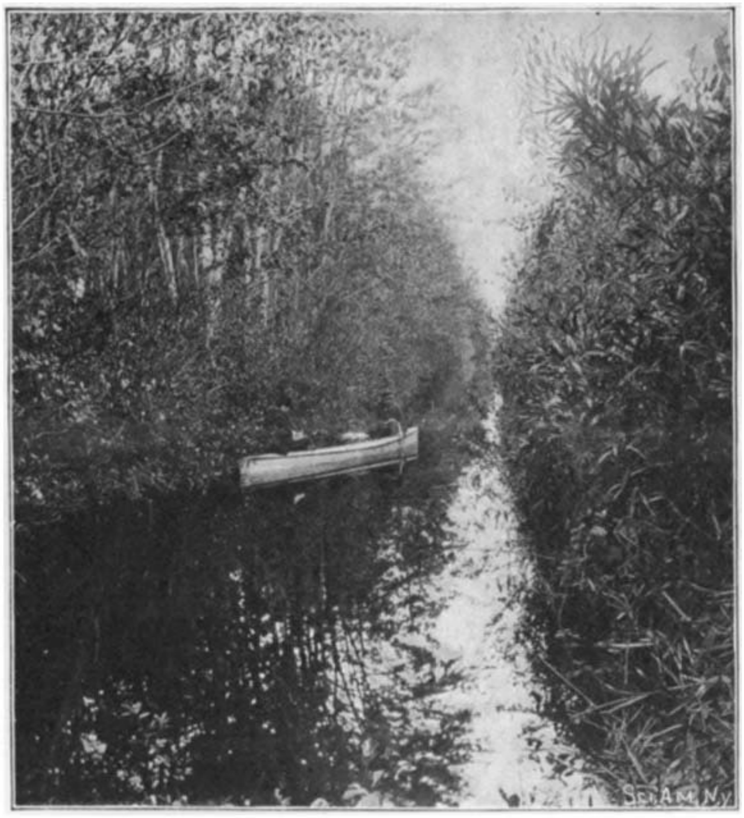
In the accompanying illustration, which represents one of the complete sets of engines, the low-pressure and reversing turbines are shown coupled upon one shaft, and the high-pressure turbine upon the other. One valuable feature of this system of propulsion is that the thrust of the propellers is entirely 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.

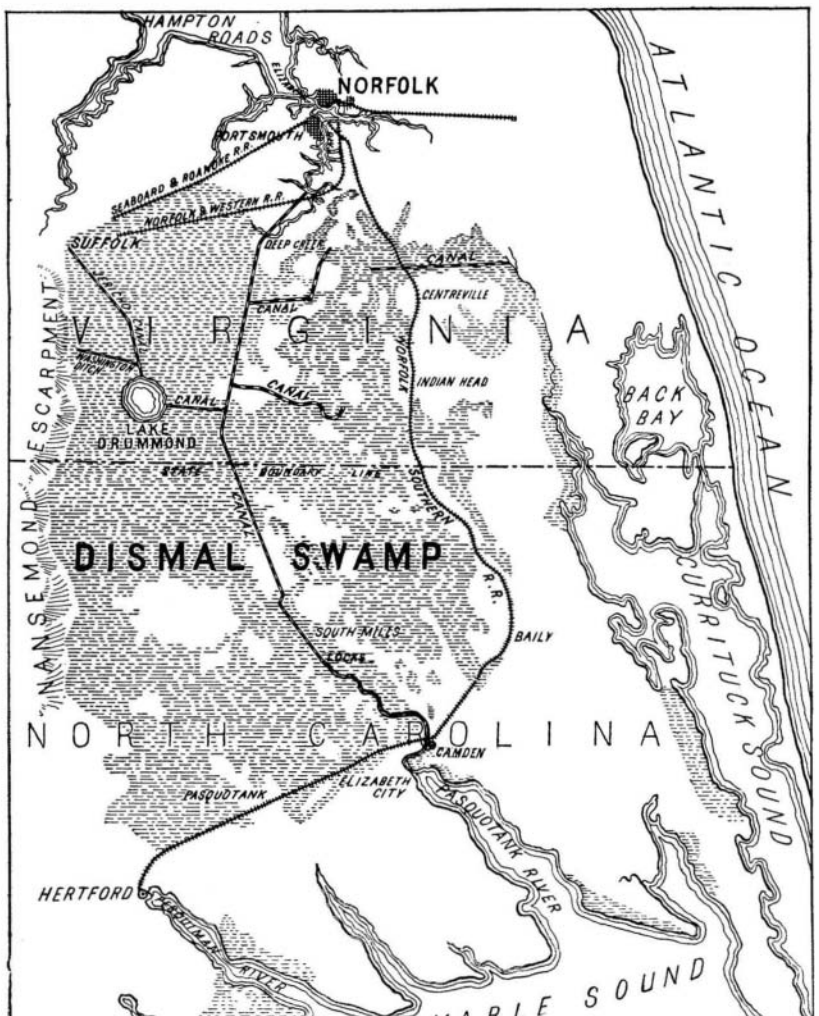
The Finding of the South Magnetic Pole.

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.

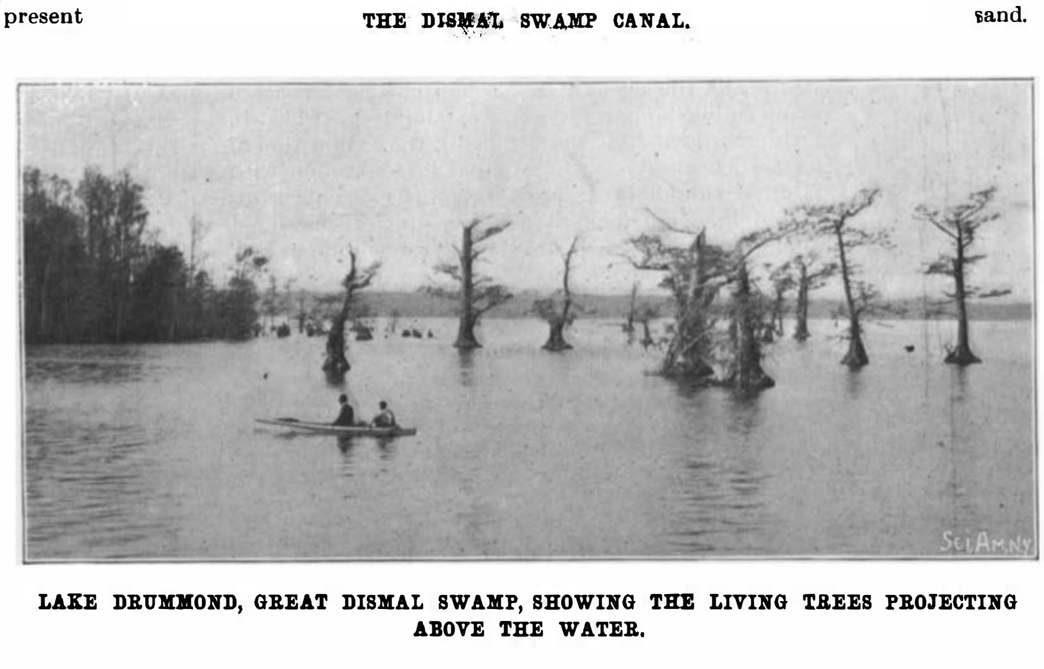
WITH the completion of the extension of the Dresden tramways now in hand there will be about 70 miles of line worked by electricity. A new generating station is being erected at a cost of $1,300,000. In the new station there will be installed five steam sets of 1,000 horse power each, while a further 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 purchase 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 innundated 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 processes 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 dessicated.

Probably the most interesting feature in the typography 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 glaciated areas. The vegetation exhibits a great diversity over the