permanently. As the low fens of England have been reclaimed to the extent of some 1,000,000 acres, it is believed that several times that amount of land along our two coasts can be converted into good farming land at an expense much less than that required to irrigate the semi-arid plains of the West. Agricultural engineers all along the coast have studied the problems presented, and in several instances private companies have undertaken the work of saving the salt meadows for farming purposes.

Closely allied to this subject is that of saving from the sea, land already formed and in excellent condition for building or farming purposes. The encroachment of the sea upon the land is steady and disastrous at many places along the coast, washing away valuable beaches and farming land during every heavy storm. So uncertain is this constant destruction of the coast that great engineering feats have been attempted in the past to protect the land. Lighthouses have had to be moved repeatedly on beaches threatened by the tides and currents, and valuable seashore property has been undermined and tumbled into the ocean until whole summer communities have been ruined. Breakwaters and other protective means have been constructed at great expense, but often without satisfactory results.

Ten years ago the Department of Agriculture decided that investigations on this subject should be made along a line that was somewhat novel to many. It was felt that grasses were the most effective agencies for shutting out the sea. Sand-binding grasses could hold the beaches in compact forms so that even the waves of the ocean could not break through the barrier. At Provincetown, on Cape Cod, the first most effective experiments were made with sand-binding grasses. These were planted to hold the drifting sands in place, and where the plants became thoroughly established, both the winds and waves were rendered powerless in moving the fine sands. Beach and sand-binding grasses are now being planted from Maine to Florida by private and public means, and they are gradually forming a compact, continuous barrier to the sea, which will be shut out for all time. The sand-storms of Cape Cod and Cape Hatteras are gradually being eliminated, and the beaches will change less and less as the roots of the grass spread.

In establishing permanent bulwarks against the encroaching sea, the government has provided working plans which all private property owners can adopt and follow. The first step is to convert the sea into a land-building instead of a land-destroying agent. This is accomplished by utilizing the tides and currents in depositing floating sand at desirable points. Hedge-rows of brush and spiles are built out into the sea at right angles to the currents and tides. These when deflected sharply to one side, deposit the floating sand particles in the acute angle thus formed, or if the water flows over the barrier the bushes and twigs catch great quantities of the loose sand and gradually build up a sandbar, and then a beach.

Whole beaches have not only been saved in this way, but new ones built up at little expense. The government has repeatedly saved valuable lighthouses from the sea by this simple method. When the beach is finally raised above the tide mark, sand-binding grasses are planted on it. These become established in time, and the powerful roots of the plants bind the land into a compact mass which can resist almost any power of the waves and tides. The whole coast is thus gradually being transformed and protected, and seaside property thus becomes of more permanent value than in the past.

A NEW POLAR EXPEDITION.

Another attempt to reach the North Pole is to be made by Capt. Joseph E. Bernier, a Canadian sea captain, who is at present in London completing his arrangements for the expedition. Capt. Bernier had prolonged experience of the Arctic seas and their peculiar characteristics while commander of a sailing vessel. He has followed with interest the movements of all expeditions having for their object the discovery of the North Pole. For six years he has been raising funds for the purpose of equipping an expedition of his own, and has received financial assistance to carry out his plans from a number of prominent men.

Capt. Bernier anticipates that his effort to reach the North Pole will occupy at least four years. His ship will be allowed to drift for three winters and two summers. By that time he expects to be within 100 to 150 miles from the Pole, and a final dash will then be made to cross the ice.

Capt. Bernier has prepared plans for a steel-sheathed ship, somewhat similar to the "Fram" used by Nansen, but possessing greater sail and steam power. She will be 120 feet long, 36 feet beam, and 18 feet deep. The vessel will be provided with a flush deck, and will be fitted with many modern appliances not hitherto possessed by Arctic explorers. The ship will be heated partly by electricity and partly by steam. A distilling apparatus will be carried, so that pure water will be always assured, and two electric stoves for cooking purposes will also be provided to maintain the vessel in an absolutely dry condition, for dampness is one of the greatest enemies of the Arctic explorer.

The ship will be equipped with a complete system of telephones, so that communication between the wheelhouses, engine-room, crow's nest and cabins will always be possible.

A telescopic pole is to be fitted to the mainmast, to enable it to be raised to a height of 200 feet if necessary, so as to permit of communication between the ship and parties on shore by wireless telegraphy. Capt. Bernier thinks by this means it will be possible for him to maintain communication with Dawson City, Alaska, during the first winter in the ice, and the second year he will endeavor to communicate with the world by wireless telegraphy to either Dawson City or Hammerfest, which latter port will then be 1,200 miles distant. In view of the fact that, according to several experiments that have been made from time to time, ether communication of this description is more easily maintained in a lower and cold temperature, Capt. Bernier should experience little difficulty in this direction.

The expedition will set out from Vancouver, on the Pacific coast, before July 1, 1903, so as to reach a point sufficiently far north by the arrival of the winter. The vessel will shape her course for Bay St. Lawrence, and will call at Port Clarence, to which port supplies will be sent ahead by a schooner.

Port Clarence will be the last port of call. The expedition will spend the first winter in the ice about 150 miles north of Point Barrow. Then in the spring the vessel will drift to a point about 150 miles distant from the Pole. As the expedition proceeds northward on this drifting voyage stations will be established, with food supplies, at intermediate points. The men sent out from the ship for this purpose will keep in communication with Capt. Bernier by wireless telegraphy.

For the final dash to the Pole, which Capt. Bernier will make across the ice, he intends to use two specially designed five horse power motor cars, each capable of holding 2,000 pounds. The motors are so designed that if the exigency arises they can be quickly converted into boats, each holding several persons.

Food stations will be established at mile intervals after Capt. Bernier leaves the ship, the food being intended for the return journey to the vessel. It will consist of condensed foods packed in cylinders, and each cylinder marked by a flag, so that its position can be readily detected. Dogs will also be taken on the journey across the ice from the ship to the Pole.

Fresh provisions for the party while drifting northward will be taken by Capt. Bernier in the shape of lambs, pigs and other live stock. The expedition will carry a balloon for the purpose of observing the condition of the ice far ahead, and likewise kites for aerial photography.

Capt. Bernier will provide for every emergency, and a man desiring to join the expedition must be prepared to stay at least four years in the North. A crew of fourteen men will be taken. The vessel will be equipped with two windmills, placed near the port and starboard lights respectively, to furnish power for heat and light. One of the windmills will also be connected with a pumping apparatus for keeping the ship clear of water when necessary.

NEW SALT OF GLUCINIUM.

Messrs. Urbain and Lacome have lately discovered a new volatile salt of glucinium which presents some remarkable properties. When the hydrate of glucinium is dissolved in dilute acetic acid and the solution evaporated in a water-bath, a mass of gummy consistency is obtained. This substance presents none of the characteristics of a definite compound, although it has been supposed to contain a basic salt. If this mass is treated with concentrated and boiling acetic acid, a solution is obtained which upon cooling gives in the first place a deposit of crystalline needles, and then, at a lower temperature, of octahedral crystals of a well-defined form, which finally remain alone. This new compound is insoluble in cold water, but boiling water dissolves and also decomposes it. It is but slightly soluble in alcohol and nearly insoluble in ether. It dissolves in concentrated acetic acid when hot, but at 17 deg. C. there remains scarcely one per cent in solution. Chloroform is by far the best solvent, and takes up a large proportion. At a temperature of 284 deg. C. this body melts to a colorless and mobile liquid. It distills without decomposing at the normal pressure at 331 deg., and its vapor may be heated as high as 360 deg. in presence of air without undergoing alteration. This property enabled the experimenters to determine its vapor density at the temperature of boiling mercury by Meyer's method, and they obtained for result D = 13.9. This figure corresponds to a molecular weight of 401. As the atomicity of glucinium is a disputed point, the new compound may throw some light on the question. Its molecular weight and analysis lead to the formula $[CH_2CO_3]_6$ $Gl_4O = 406$, admitting $Gl = 9$ and $GlO = 25$. It is impossible to conciliate the composition of the body and its vapor density by supposing $Gl = 13.5$ and $Gl_2O_3 = 77$. This result gives a new argument in favor of the diatomicity of glucinium. If the physical properties of this body are singular, one of its chemical properties is not less so, for this basic salt is formed in a solution which is extremely acid. Besides, in dissolving the body in concentrated acetic acid saturated with gaseous hydrochloric acid, the salt did not undergo any alteration, although it was heated for several hours in sealed tubes at 150 deg. C. It must be concluded that in this compound the basic function of the glucina is masked. The authors are carrying out further experiments on the subject.

SCIENCE NOTES.

The town of Molsen, Wash., recently went into bankruptcy and finally into the hands of a receiver. It is now in charge of a trustee.

The President of the Jersey City Board of Health has decided that the city hospital is so infected with disease germs that it should be burned, the sanitary conditions being so bad that it is impossible to remedy them.

A cinematograph picture has been taken of the Severn bore. It is believed that this is the first moving picture of a tidal bore. The film is 150 feet long and contains 2,400 individual pictures. About half the length is devoted to the bore itself, and the remainder shows the rapid current which follows and the filling up of the river.

The Police Board of Jersey City, N. J., have decided that a bronze cross shall be given to policemen who distinguish themselves by the arrest of desperate criminals, saving life or for any other cause which shows their courage and faithfulness. The cross is to be suspended from a bar which is to be inscribed "The Bronze Cross." In the center of the cross will be a representation of a policeman's shield. A certificate will be given to the man with the cross. For any flagrant violation of the rules the cross can be taken away.

In the High School in Sioux City, Iowa, the School Board has undertaken what is proving to be a very successful experiment in serving hot lunch to the pupils at cheap prices, says The Municipal Journal. A lunch room has been fitted up, and there the scholars can purchase many hot dishes at minimum rates. Everything is sold for checks, which can be obtained in lots of ten and twenty-five cents' worth. Much time is saved in this way, and it is possible to serve ninety boys and girls in ten minutes. A woman runs it for the Board, and is allowed to make a little out of it. Everything is clean and the food of the best.

Sir W. H. Preece, formerly chief electrician to the British Post Office, has been engaged for some time past upon a study of the magnetic influences upon the compass of the Manacles Rocks off the coast of Cornwall, and upon which the steamships "Mohegan" and "Paris" were wrecked. Sir William Preece states as the results of his investigation that if any navigator sets his course from Cherbourg to the Lizard without knowing the variation of the magnet that has occurred during the last five or six years he would run upon the Manacles. The variation was bringing the needle nearer to the North Pole, and in ten years it varied a whole degree. The difference of a degree in a magnet signified an error of one mile in a course of sixty miles, so that unless the captain's observations were maintained with all accuracy and care, if the Admiralty did not correct their charts from time to time, and if captains of ships did not make themselves acquainted with these different errors, then sooner or later disaster was certain to occur.

M. Santos-Dumont, upon his reception in England by the newly-founded Aero Club of Great Britain, discussed his forthcoming experiments with his new airship that is in course of building for use in 1902. It will be the seventh and largest machine he has yet employed. It will be fitted with two petrol motors of forty-five horse power each, as compared with the sixteen horse power motor of the previous vessel. At present he has decided to carry out his experiments upon the lines in which he has been so successful. It is his contention in connection with navigable balloons that aeroplanes should not be used. M. Santos-Dumont thinks that petrol will be the sole power employed for aerial traffic, since with a petrol motor half the motive power is derived from the air, thus minimizing the weight of fuel to be carried. Electric and other motors must carry all motive power in bulk. The outer balloon of No. 7 will be cigar-shaped as before, but it will have two inner cases instead of one. There will be no framework inside, the material being kept rigid solely by pressure. M. Dumont intends continuing his experiments with machines with a carrying capacity of one person only for the present.