

has simply created a new world. American pressed glass, which has completely revolutionized the supply of table and house ware, is an invention of the last sixty years. The silk manufacture has not existed in this country half a century; the paper made a hundred years ago would hardly be thought fit for use since modern methods have been invented; the only use discovered for India rubber then was to erase pencil marks; and while the town of Lynn made 100,000 pairs of boots and shoes in 1788, they were not the shoes of to-day, and the manufacture by machinery is wholly due to inventions since 1800. Sewing machines for any purpose were unknown, and salt was made by boiling sea water, though in 1787 it was first made from the springs near Syracuse at the rate of about ten bushels per day, and the cost soon fell to 50 cents per bushel.

"Farming in Washington's day knew nothing of machinery; even the first iron plow, patented in 1797, was a failure, for New Jersey farmers thought it poisoned the soil. Mowers, reapers, and harvesters began to be invented about the same time, and even the ordinary implements were such as it would not now be thought possible to use. The steamboat was practically unknown, and the railroad entirely until forty years later, and the cost of transportation by wagon confined the area of possible production with profit, as to most crops, to the margin of navigable waters. The whole nation could not produce in Washington's day as much wheat as single Territories not yet States now export each year, and when the accounts of a century ago tell of "vast quantities" exported, they really mean less in a year than the country has since moved in a single week.

"Volumes could be filled, and yet but a small part of the change in industry within the century could be mentioned. But the revolution in the condition of the laboring population has been the crowning result of all this progress. Of wages, it is enough to say that masons a century ago earned 67 cents a day in Massachusetts, carpenters 52 cents, blacksmiths 70 cents, and ordinary labor 30 cents. Food near the farms was cheap, but pork is quoted in Massachusetts at 16 cents per pound, flour at \$8.16 per barrel, corn at 76 cents per bushel, and ham at 20 cents per pound. Calico cost 58 cents per yard, broadcloth \$2.70, buckram 22 cents, cotton cloth 88 cents, and tow cloth 30 cents; hose cost \$1.35 per pair, and "corded Nankeen breeches" \$5.50; buttons from 1 to 5 shillings per dozen, shoes of lasting 84 cents per pair, and sugar from 15 to 22 cents per pound. One does not need to study such figures as these very long to discover that the world and the living of to-day were simply impossible for the working people a century ago. The whole world has changed, but nowhere has the marvelous advance been greater or for the working millions more beneficent than in these United States."

FLOATING WRECKS.

The International Maritime Conference, which will assemble at Washington in October next, among other important matters pertaining to the saving of life on the ocean, will be called upon to consider the wisdom of dividing the Atlantic Ocean into districts and assigning them severally to the great naval powers, who will be expected to remove derelicts or wrecks which may be considered in any wise dangerous to commerce. For the past three years the Hydrographic Office of the Navy Department has been of great service to mariners by collecting information regarding derelicts, their movements, changes in character or position, by the action of the elements or other causes, and publishing the same on the first of each month in the form of a pilot chart, which also contains a large amount of other information of the greatest value to the navigator.

Subsidiary to the work of the Hydrographic Office in locating dangerous wrecks and reporting the movements of derelicts have been the operations of the naval vessels to which has been assigned the work of blowing up such of these obstructions to commerce as may be considered of a specially dangerous character. Most derelicts are lumber-laden and come from Southern ports of the United States. The Gulf Stream flowing strongly in a north-northeasterly direction, they are apt to be carried along with it until they strike the Labrador current flowing south, and then their course is reversed.

The American schooner W. L. White, abandoned off Cape Hatteras in the blizzard storm of March 13, 1888, is a case in point. She floated north with the Gulf Stream until she got into the Labrador current off the Grand Banks in the following May. Here she remained floating to and fro in the very track of many ocean steamers during the entire summer of 1888 and until October 30, when she took an easterly and then northeasterly course, and finally went ashore on the Hebrides January 25, 1889. During the cruise of this derelict, covering ten months and ten days, she must have covered a distance of at least five thousand miles.

Naval vessels frequently receive orders to look out for certain derelicts and to blow them up when found. The United States steamer Despatch, Lieutenant W. S. Cowles, though not specially adapted for this work, has done a considerable amount of it. After the great

storm of March, 1888, a number of wrecks demanded immediate attention, and one of these was the bark Brimega, which had capsized off Cape May and lay bottom up inside the cape and grounded. The course pursued in blowing it up was as follows: Men from the Despatch, under command of Lieutenant McLean, got upon the hull, and with augers and axes penetrated through twenty inches of oak, and made four holes large enough to admit the torpedoes. These torpedoes consist of a cast iron shell cylindrical in form, three feet long and about a foot in diameter. There are handles on the sides, and from the head projects an iron tube, into which the electric wire passes. The tube is fitted with a plug to keep out the water, and the wire then passes through a papier-mache cylinder nearly to the nether end of the torpedo, where it is connected with a very thin platinum wire, and this again is surrounded with guncotton. Fine gunpowder is placed next to the guncotton, and above that the coarser grain, a hundred pounds of powder comprising the whole charge. When all was ready for the explosion, the men took to their boats and withdrew to a distance of from 150 to 200 feet. The officer in command of the operations paid out a wire from a reel which he held in his hand, and when the proper distance was reached he connected one end of it with a hand dynamo, which is known as the government torpedo station machine. The electric current is instantly sent into the torpedo, the platinum wire is heated to a white heat, the guncotton ignited, and the torpedoes, weighing about 325 pounds each, are instantly exploded. The wreck was broken in pieces, though subsequent explosions had to be made before the destruction was complete.

The masts of sunken vessels which extend above the surface of the water or terminate just below it are extremely dangerous to navigation, and the steamer Despatch has been frequently called upon to remove such obstructions. After proceeding to the locality indicated on the pilot chart issued by the Hydrographic Office or in special orders from the Navy Department, a survey is made and the position of the wreck determined upon as nearly as it can be from the deck of the steamer. Two boats then put out for the wreck. One carries the torpedo, with five men to handle it and six men at the oars. The other boat contains the officer in charge of the work, with a competent crew, and the apparatus for exploding the torpedoes. The steamship Eureka, which was wrecked off the Maryland capes, was found resting on the bottom. Two of her masts, which were of iron, extended above the water line, and two terminated just below it. To remove these obstructions a torpedo was let down by a guide rope to the deck of the vessel, placed against the masts, and exploded in the same manner as previously described. A conical column of water was thrown up to a distance of nearly 75 feet, and the masts were completely destroyed.

Sometimes wooden masts are found sticking out of the water and held in position by sunken wreckage. When the torpedo is set off, large pieces of the wood rise to a considerable distance in the air, seemingly whole, but as they descend they separate into a thousand pieces. On attaching the torpedo to the object to be destroyed, care has to be taken that it comes in direct contact with the object, for if any considerable amount of water is allowed to intervene, it acts as a cushion and a great deal of the force of the explosion will be lost. When sunken hulls are found, soundings are made, and if it appears that they are not covered with a sufficient depth of water to render them free from danger, torpedoes are let down with guide ropes and exploded in such a way as to destroy the hulls. This kind of work is slow and tedious, and can only be successfully carried on in a vessel like the Despatch, during fair weather and with a smooth sea. The area covered by the steamer Despatch in her cruises for derelicts is from seventy-five to a hundred miles and extends from Chesapeake Bay to Boston Harbor. The explosives used are not considered the most effective by the naval officers in charge of these operations, and they hope that guncotton or dynamite in time will be substituted for them.

Lieutenant Geo. P. Blow, now in charge of the New York branch of the Hydrographic Office, was in May, 1885, on board the United States man-of-war Pensacola, Captain Geo. Dewey. When six days out from Norfolk the floating derelict Bertha Balruhs was sighted. Upon examination she appeared to have been abandoned a long time. Her deck was level with the water, the sea was making clean breaches over her, and her sails were hanging in shreds and festoons from the yards. A guncotton torpedo was placed under the floor of the cabin, which blew off the deck house and did other damage. Another torpedo was exploded amidships, which shot the main mast up into the air like a rocket, but it settled back into its old place again, and the derelict continued to float along as before. Then the explosives were lashed to the keel of the vessel, and they shattered her so completely that in a short time she went to pieces.

The United States man-of-war Yantic has recently received orders to search out and destroy the derelict Vizenzo Perotta, which was wrecked off the capes of

Virginia on September 18, 1887, and has been floating about the ocean ever since. She is loaded with lumber, has been reported eighteen times between the scene of the wreck and the coast of Cuba, and is considered a very dangerous derelict. There are nine derelicts now known to the Hydrographic Office, including the steamer Danmark, recently reported, and fifteen the names of which are not known.

Some derelicts are destroyed by collisions and others by the action of the elements, while others float a long time bottom upward, the air keeping the water from coming in and working their destruction. They are a constant menace to passing vessels, and there can be no doubt that some at least of the vessels which have gone out from port and have never been heard from were the victims of some derelict.

Information regarding the movements of derelicts and the position of various obstructions to navigation are reported to the several branch hydrographic offices which are now located at New York, Boston, Philadelphia, Baltimore, Norfolk, New Orleans, Portland, Oregon, and San Francisco, Cal. This information is sent to Washington, where the main hydrographic office is located, in charge of Lieutenant Geo. L. Dyer as hydrographer to the Bureau of Navigation. Here the information is classified and published on the first of every month in the form of a chart, upon which is also indicated the latest positions of derelicts, location of icebergs, course of ocean currents, fogs, probabilities of whirlwinds, waterspouts, and tornadoes, as well as other information. Every vessel, of whatever nationality, leaving the principal American ports is supplied with a set of charts, corrected to date, without charge.

Recently the co-operation of Captain Carbonell, the director of the newly established Marine Observatory at Havana, Cuba, has been secured, by which the Hydrographic Office will receive telegraphic information of tornadoes which may be approaching our coasts.

President Barnard, of Columbia College, N. Y.

On Saturday, April 27, at 4:15 P.M., President Barnard, of Columbia College, died. In his death a loss is inflicted not only on his college and city, but on the country at large. He ranked with the most advanced thinkers of the day, and did much to enhance the scientific standing of the United States.

Frederick Augustus Porter Barnard was born May 5, 1809, at Sheffield, Berkshire Co., Mass. He was of English ancestry. In 1828 he graduated at Yale and at once began his life work as an educator by accepting a position in the Hartford grammar school, and in 1830 became a tutor at Yale. It was soon proposed to make him professor of pure mathematics, but he was forced to decline on account of his health. In 1831 he taught in the Deaf and Dumb Asylum in Hartford, and 1832 in the corresponding institution in New York. From 1837 to 1848 he filled chairs of the natural sciences in the University of Alabama in Tuscaloosa, and after this in the University of Mississippi in Oxford. In 1856 he became president of this university. There he had as fellow professor Jefferson Davis, afterward President of the Southern Confederation. In 1854 Prof. Barnard had been admitted to the ministry of the Protestant Episcopal Church. During the war he did excellent service on the U. S. coast survey. He then became an applicant for the chair of physics in Columbia College, but was appointed president instead, succeeding Dr. Charles King. This position he accepted in May, 1864. About a year ago he resigned, but the trustees, anxious to have him complete a term of twenty-five years, delayed the acceptance of the resignation. It will be noticed that but a few days remained to complete a quarter century of devoted service to the college when he died.

His mind, of strongly scientific bent, found many outlets. In microscopy and astronomy he did excellent work. He accompanied the U. S. coast survey expedition to Labrador to witness the total eclipse of the sun in 1860. Much of his work on the coast survey was in astronomical science. He was also president of the American Microscopical Society. He was one of the original incorporators of the National Academy of Sciences, has been president of the American Association for the Advancement of Science and of the Board of Experts of the American Bureau of Mines. He was one of the U. S. commissioners to the Paris exposition of 1867, and his elaborate report on Machinery, Processes, and Products of the Industrial Arts and Exact Sciences is, at the present day, excellent reading and a standard reference. He, with Professor Guyot, was a chief editor of Johnson's Cyclopaedia. He was an ardent advocate of the metric system of weights and measures, and to the above cyclopaedia, among other matter, contributed a most elaborate article on the weights and measures of all countries.

He was the recipient of honorary degrees from many universities, and his life work covered so extended a field that space will not permit even a full recapitulation of it here. In the great scientific development of Columbia College through the School of Mines the predominant bent of his mind found most congenial work. His funeral took place on May 2, and was attended by a numerous and representative assemblage.