THE LIGHT DRAUGHT COMPOSITE GUNBOATS.

(Continued from first page.)

The vessel once in motion, the weight of any marine growth, assisted by the characteristic exfoliation of the copper plating, would cause its release, and in this very simple natural evolution we have a means of making these vessels more extensively independent of coal piles and docking facilities than their sister ships, while assuring them a much more extended radius of action—limited in the twin screw boats to the possibilities upon their coal supply, measured in the single screw, sail-powered boats principally by a matter of provender, for the spread of 11,165 square feet of canvas is deemed sufficient to assure a sailing speed equal to that of the best steaming conditions.

THE NEW TORPEDO BOATS.

A second triple addition to the mosquito fleet of the United States navy has been provided for in the act of Congress of March 2, 1895, appropriating for the construction of torpedo boats Nos. 6, 7 and 8, the individual cost of which, including governmental superintendence, preparation of plans, and the provision and installation of ordnance outfit must not exceed $175,000—a moderate allowance, which, but for present prices and skillful management of design, would be impracticable.

With the completion of these and the three other boats authorized in 1894, the service will be possessed of eight craft of this order, representing four periods of constructive and engineering progression within the past six years. Of their kind, that of torpedo boats pure and simple, the new vessels will be the largest in the world and unexcelled by those of any other nation, while in point of speed and weatherliness they will closely approach the more formidable torpedo boat catcher—features demanded by our broken coast line.

With a displacement of 180 tons, they will be 170 feet between perpendiculars, with an extreme water line beam of 17 feet upon a mean, normal draught of 5 feet 6 inches. The hulls are models of the most recent practice; with an easy razor-like entrance and a long fine run below water toward the screws. The "tumble-home," which begins just forward of the midship section, increases afterward, where it broadens out over the propellers, giving a very full water line area of shallow draught. This flat form of stern prevents the settling so common to torpedo boats under full power, while holding to the water in all conditions of weather and preventing racing of the screws.

The boats will be built of steel. The armament will consist of three 18 inch torpedo tubes on swivel mounts and of four 1 pounder rapid-fire guns. Six hundred rounds of ammunition will be allowed for the guns, while four automobile torpedoes—the type yet undetermined—will be provided; the spare one being carried in a steel stowing case on the starboard beam. The torpedo discharges will be arranged on the main deck, two forward and one aft, the forward tubes being placed slightly en echelon, admitting of considerable athwartship fire in addition to the extended field of action of each on its own side. The after discharge will be on the center line, and will have an unhampered sweep of 280 degrees. This emplacement is devoid of "dead angles," and gives an all-around discharge of great scope.

The conning towers, of which there are two, will be near the bow and the stern, each about 35 feet from its respective end. Hand steering gear will supplement in the forward tower the steam mechanism common to both towers, affording one more chance in case of mechanical failure.

The forward tower will be surmounted by one of the 1 pounder guns, to be worked from a gallery on the after side. The three others will be mounted along the sides, two on the port and one on the starboard.

The freeboard forward is carried up to a height of 12 feet 6 inches, adding materially to the sea-going qualities of the boats while yielding increased berthing space for the crew and a housing for some of the forward mechanisms.

So important is speed in this type of craft that fifty per cent of the total displacement will be absorbed by the boilers, engines and appurtenances, and the magnitude of this amount may best be appreciated when it is known that this allowance is just double that for the motive mechanism of the commerce destroyers Columbia and Minneapolis.

The engines, which are of the triple expansion sort, each in its own water-tight compartment and actuating a separate screw, are very fine examples of power and compactness, beautifully balanced, with a very nice distribution and division of weights. With a common stroke of 18 inches, impelled by steam at a pressure of 250 pounds to the square inch, supplied by three water tube boilers that flank the engine space—two forward and one aft—the two 6 foot manganese bronze screws will be driven by the engines at the rate of 395 turns a minute, developing an indicated horse power of 3,200, and driving the boats through the water at a speed of 26 knots an hour.

The normal coal supply will be 12 tons, with a total bunker capacity of 60.

There will be no search lights, but the boats will be lighted by electricity; and natural ventilation will be ample to insure comfort under all conditions of service. Folding boats will be carried.

The officers will be aft, while the crew will be provided for in the forecastle and just below on the berth deck. Excepting the captain and engineer, who will have separate state rooms and bunks, the two other officers, the four machinists, and the sixteen seamen, each in a common country, will sleep in folding berths, easily turned out of the way to afford added space and comfort when not in use.

No premiums are offered for increased speed, and, with the well-known governmental margin of safety, the penalties for decreased speed need not be feared; while even a more excellent performance may reasonably be hoped for.

One boat will be built by Moran Brothers Company, of Seattle, Washington, for $163,350, and the two others will be built by the Herreshoff Manufacturing Company, of Bristol, R. I., for $144,000 apiece.

Science Notes.

Anthion.—The Chemische Fabrik, of Berlin, says the Revue Universelle, has recently put upon the market an oxidizing substance, the properties of which have been long known to chemists. It is the persulphate of potassa, and is prepared by electrolysis in submitting a solution of sulphate of potassa to an electric current. There occurs an oxidation and a deposit, at the positive electrode, of the persulphate, which is, in fact, less soluble than the ordinary sulphate, while hydrogen is disengaged at the negative electrode.

There is obtained a very light precipitate which readily crystallizes through solution in warm water, and which in cooling yields brilliant crystals having a reflection comparable to that of mother-of-pearl. These crystals are sold by the Berlin works under the name of "anthion." This substance, like all bodies whose stability is not perfect, is a remarkable oxidizing agent either in neutral or slightly alkaline solution.

It is employed in dyeing and serves for decolorizing indigo and various other substances. It is also used for bleaching fabrics. But its greatest utility, without doubt, is the application that can be made of its properties in photography. The difficulty of removing the hyposulphite of soda in excess that has served to fix photographic images is well known. However prolonged be the washing, a certain quantity of the hypo always remains, and it is precisely this salt that gradually, in time, deteriorates the best prints.

Anthion exerts its oxidizing action upon the hyposulphite with advantage, and, abandoning its oxygen to the profit thereof, converts it into tetrathionate. The modus operandi is simple. A preliminary washing is done as usual in order to remove the greater part of the hyposulphite of soda. The negatives are afterward immersed for a few minutes in a solution containing no more than a half per cent of anthion, and all that remains of the hyposulphite is converted into tetrathionate, that is to say, into a substance that is no longer a reducing agent.

Solidified Gelatine.—Gelatine possesses the curious property of becoming insoluble in contact with formic aldehyde, and, at the same time, of preserving perfect transparency. Gelatine rendered insoluble, or "petrified," to use a more appropriate term, resists water, acids, and alkalies. It resembles celluloid, but has the great advantage over the latter of not being inflammable.

We have here, then, a new product very easy to obtain, possessing interesting properties and destined to play an important role in the industries.

The gelatine used is the ordinary article found in commerce. The formic aldehyde is what is commonly called "formol," "formaline," and "tannaline." The commercial product is a 40 per cent solution of formic aldehyde in water. It is a colorless, sirupy liquid of a pungent odor. The vapor is not inflammable, and it is a powerful antiseptic.

In order to obtain moulds of statuettes, etc., we take, for example, two pounds of good white gelatine and steep it in a quart of water for a night. The next day the whole is melted over a water bath. For delicate mouldings, the solution is diluted with a little water.

The mould, which may be made of plaster, clay, or metal, having been prepared, the formic aldehyde is poured into the melted and slightly cooled gelatine. The whole is well stirred with a wooden spatula in order to obtain a homogeneous mixture. The latter is then poured into the mould and allowed to cool. After the object is taken from the mould it is finished by immersing it for a few instants in a concentrated solution of formic aldehyde, or, if it is too large for immersion in the solution, its surface is painted therewith. Unfortunately, objects obtained with the gelatine alone are transparent and resemble glass.

By previously adding to the gelatine some finely sifted zinc white mixed with a little water and alcohol, and in operating in the same way, beautiful imitations of white marble may be obtained.

By mixing the oxide of zinc with appropriate colors, objects of all shades may be obtained, and, by properly arranging the colors, veins, striæ, spots, etc., may likewise be produced. The solidified gelatine may be used for imitating mother-of-pearl, tortoiseshell, amber, coral, etc., and for the manufacture of toys and artificial flowers.

Antinonine.—The large manufacturers of colors in Germany are paying more and more attention to the production of antiseptics, and a French exchange mentions in this line a new product obtained from such manufacture, viz., potassium orthodinitrocresolate, which, it would appear, is destined to render great services.

Messrs. Harz & Miller have published in the Münchener Allgemeine Zeitung an account of their experiments with this new compound, which they call by the more practical name of "antinonine." A solution of 1 part to from 1,500 to 2,000 parts of soapsuds assures the destruction of all the ordinary vegetable parasites without injury to the plants. On another hand, Mr. Aubry, superintendent of the Experimental Brewing Station at Munich, has found that antinonine permits of preserving yeast for a long time, and which, without such treatment, rapidly decomposes. The yeast, moreover, does not lose its power of producing fermentation, even when very concentrated solutions of antinonine are used, say 15 parts to 100. The new antiseptic is inodorous and of a relatively low price.

Argon Thermometers.—Mr. W. R. Quinan, in a recent paper, dwells upon the advantages offered by argon as a mono-atomic gas, in the manufacture of high temperature thermometers, over the hydrogen and nitrogen generally employed. It remains for physicists to study Mr. Quinan's proposition.

Electricity in the Manufacture of Wine.—The Italian vintagers, says the Electricien, are congratulating themselves upon the use of electricity in the manufacture of wines. Through such an application it is possible to modify the bouquet and the very nature of the crop, and also to correct the effects that are so apparent in the California wines, which are much too heavily charged on account of the richness of the soil. But the value of electricity in the wine making industry does not end here. In an Algerian establishment in which the work of the Arabs is uncertain and not very satisfactory, there has been installed a complete electric plant, which takes charge of the whole business. By means of a steam engine and a dynamo, there is effected, in the first place, the lighting of the wine presses, and the current actuates in addition seven motors, of from two to ten horse power each. One of these motors actuates a sort of dredger, which gathers up the bunches of grapes piled up on the ground and deposits them in the presses. The latter are set in motion by three other motors. As for the other motors, they are directly coupled to centrifugal pumps which tun the wine.

Kauri Wood Pavements.—An experimental wooden pavement has recently been laid in one of the streets of this city. The material is kauri wood, the product of a dense West Australian conifer, the Dammara Australis. The blocks, 3 × 4 × 9 inches, are sawed in Australia and sent hither by boat. The wood is exceedingly heavy, reddish in color, and resinous in odor. The blocks are laid in a bed of molten pitch, superimposed upon an ordinary concrete foundation. The final surface is gravel and cement.

This kind of pavement has not hitherto been laid in the United States, though it is considerably used in Europe, and Piccadilly in London is paved with it. The experimental pavement has been laid with the hope that its excellency shall lead to its substitution for asphalt in the avenues now paved with that material. The agent of the Australian contractor asserts that the blocks of kauri wood can be worn down to one-sixteenth of an inch before they need to be removed, and says that his principal is ready to pave Fifth Avenue with this material and guarantee it for fifteen years.

A New Nitrated Fertilizer.—Mr. Camille Faure recently made known to the French Academy the discovery, due to the development of the electric arts, of a new nitrated fertilizer adapted for agriculture on a large scale and remarkably cheap. It is a question of cyanate of calcium, Ca $(CA_2O)_2$, which, up to the present, has existed in small quantities only in laboratories, and which has suddenly become a very important substitute for the nitrate of soda that is imported at great expense from foreign countries. It is even richer than the soda in assimilable nitrate. As cyanate of calcium is an oxidized substance, it does not necessitate the use of a great amount of heat in its production. All the manufacturing operations are performed in one and the same electric furnace, in which a mixture of limestone and coal is submitted successively to a direct preliminary heating at 1,500° C., and afterward to an electric superheating at 2,500° C., in the presence of pure nitrogen in large excess, and finally to an oxidation by the air, the oxygen of which is retained by the product, while the nitrogen carries the heat due to oxidation to the electric chamber.