

before hostilities break out, but if vessels are brought to action without previous opportunity for preparation, the "overboard" practice will be in order.

The action at Santiago brought home more forcibly than any other battle the great danger from fire in time of battle, and forthcoming instructions, it is announced, will lay special stress on precautions to be taken. Not only must hose be led out to every part of a ship, but care must be taken to protect the hose as much as possible from destruction by shell. On several of the Spanish ships hose led along deck was cut to pieces by 6-pounder shell.

In the matter of carrying small boats in time of action, the naval authorities, it is understood, will leave it largely discretionary with the commanding officers, but the opinion is hazarded that naval captains, as a rule, will strip down to two or three boats. During the civil war the practice sprang up of dropping the small boats clear of the ship on going into action, and the same practice was observed to some extent in the Spanish war. On the larger vessels a steam cutter and a couple of pulling boats, say a whale boat and launch, constituted the outfit. It is contended that, in a prolonged artillery duel between ships, any boats carried in the cradles will be shot to pieces. There will be the danger arising from splinters, to say nothing of adding to combustible material. Even if the boats are not set on fire, they will probably be so badly damaged as to make it impossible to use them. The instructions, it is said, will suggest that commanding officers encourage their men to rely upon life preservers.

The war color for warships which most nearly approximates to the horizon and rocks has been found to be a dull gray, with a yellow shade. LIEUT. G. L. CARDEN, Ordnance Officer, U. S. S. "Manning."

CHIEF CONSTRUCTOR PHILIP HICHBORN.

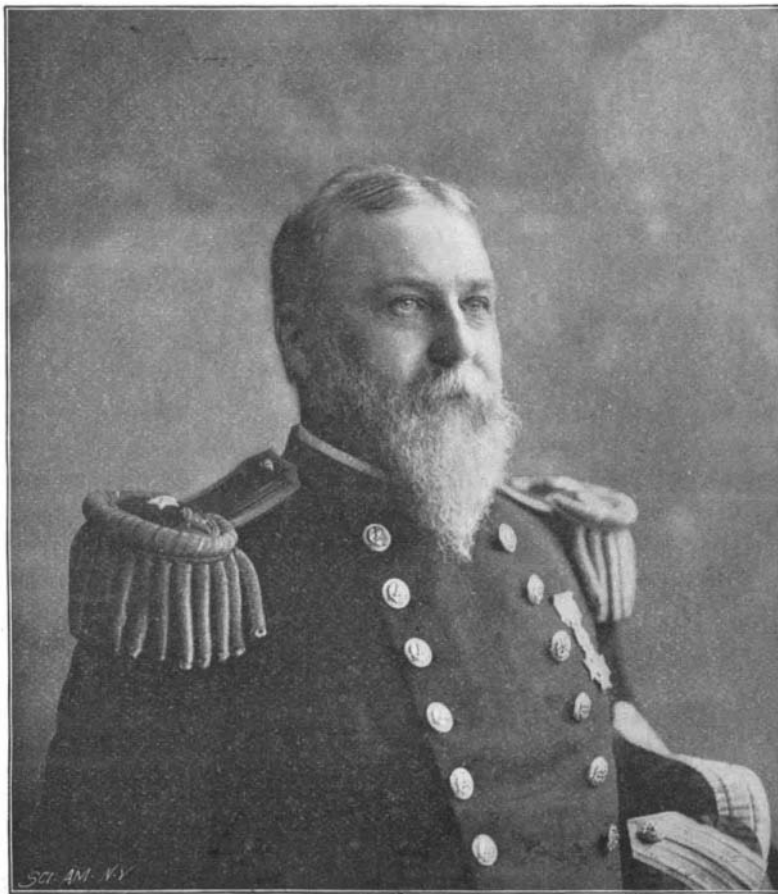
When we consider the brilliant naval victories of Manila Bay and Santiago, we are apt to forget the labors of those who made the success possible. The truth of the matter is that the victories were gained months and years previously in the draughting rooms in the State, War and Navy building at Washington. We do not wish to discount in any way the bravery and skill of the line and engineer officers who navigated and fought the ships with such success. At the same time the bureau chiefs and their subordinate officers who toiled all through the spring and early summer, buying new vessels, converting them from peaceful to warlike use, making and shipping supplies and attending to all of the manifold wants of an enormous fleet of 312 vessels, should not be forgotten. The good work accomplished by the Bureaus of Yards and Docks, Equipment, Navigation, Arms, Construction and Repair, and Steam Engineering, will ever remain one of the most pleasing and satisfactory remembrances of the war.

The subject of our sketch is Commodore Philip Hichborn, Chief Naval Constructor, U. S. N. A great deal of the hardest work which was done in the navy in the preparation of vessels for active service during the war was accomplished by the bureau over which Commodore Hichborn presides, and we have already, on another occasion, given an outline of the volume of work performed, and the results of the blockading fleets and the fighting speaks for the quality of work performed.

Commodore Philip Hichborn was born at Charlestown in 1839, and graduated from the Boston High School in 1855. He then entered French's Mercantile College and graduated from it in 1859. At the age of fifteen he acted as assistant secretary to Admiral T. H. Gregory, the commander of the Boston navy yard, and a year later he was indentured to the government as shipwright apprentice. During his apprenticeship of five years he successfully mastered every detail of the shipwright's trade, so that he has a knowledge of not only the modern, but the old system of shipbuilding. In recognition of his merit, Secretary Toucey ordered that he should receive a course of theoretical training, and he made remarkable progress in ship designing and calculations in another two years' course of theoretical training under Prof. Moller. In 1861 Mr. Hichborn obtained a position as carpenter of the clipper ship "Dashing Wave," bound for San Francisco. The voyage was a tedious and tempestuous one of some one hundred and fifty days. The third mate became ill, and Mr. Hichborn was required to act in his place, and he performed the duties of that officer with remarkable success. Upon arriving in San Francisco he worked for the Pacific Mail Company and the California Steam Navigation Company, and then once more entered into the employ of the government at Mare Island. He had various positions at this yard, and in 1862 was appointed master shipwright, which was a very responsible position for a man twenty-three years of

age, for he had at times the direction of over one thousand men. Two years later he declined the position of Assistant Naval Constructor, but in 1869 he made application for appointment, and in May of the same year, after passing a severe examination, he was appointed as Assistant Naval Constructor, U. S. N., with the relative rank of Lieutenant. The training Mr. Hichborn had received in the yard and drawing office made the performance of his new duties comparatively easy. In 1870 he was sent to Portsmouth, N. H. A farewell ball and procession were given in his honor at Vallejo before he left. At Portsmouth Mr. Hichborn passed years of fruitful experience in building and repairing vessels. In 1875 he received his commission as Naval Constructor, having passed a competitive examination at the navy yard, in which he succeeded in distancing all his competitors. In December, 1875, he reported for duty at the Portsmouth navy yard. At this time the yard was being abandoned and the machinery stored and prepared to be transported to the new yard at League Island. A large share of this important work devolved upon Mr. Hichborn. He was always a strong advocate of the natural advantages of the island as a steel shipbuilding yard for the navy, and during the nine years he was on duty there he did all in his power to put it in condition for government work. He completed and repaired a large number of vessels at this yard.

In 1880 he was selected as a member of the first Advisory Board, from the organization of which was given



COMMODORE PHILIP HICHBORN, CHIEF NAVAL CONSTRUCTOR, U. S. N.

the first impulse to naval reconstruction. In addition to his regular duties at the yard, he had charge of the completion of the "Terror" and "Amphitrite" and superintended the launching of these vessels. In 1884 he was selected by the Secretary of the Navy for special duty in Europe, and, in accordance with the orders of the department, made a tour of the dockyards of Europe, and upon his return he submitted a valuable report to the department, which is considered a standard work upon the subject. In November of the same year Mr. Hichborn was ordered to the Navy Department at Washington as assistant to the Chief of the Bureau of Construction and Repair, and also as Naval Constructor at the navy yard, Washington. He was also a member of the Board of Inspection and Survey. The duties of these very responsible positions, which he performed simultaneously, were rather trying, but his professional knowledge, sound judgment, and executive ability enabled him to perform the duty of these offices with great satisfaction to the department. Since his appointment as a member of the Advisory Board, in 1881, he has been prominently associated with matters affecting designing and construction of our new naval vessels. Mr. Hichborn was appointed Chief of the Bureau of Construction and Repair in September, 1893, and he now holds the relative rank of Commodore while he occupies this office. His position is comparable to that of the Chief of Naval Construction in England. He was reappointed for a second term on September 7, 1897. He redesigned the armorclad "Terror," converting her from a single turret monitor of doubtful utility into a double barbette turreted coast defense vessel of a very formidable type. These highly efficient barbette turrets were unanimously approved by the board

of the Bureau Chiefs and have since been adopted for the "Amphitrite" and "Monadnock" and other vessels. Mr. Hichborn is a member of a number of societies devoted to the interest of shipbuilding, and he has devoted much time to literary work, chiefly upon subjects of a professional nature. His advocacy of sheathed ships is gaining in favor among men in the navy. He has also given great attention to life saving apparatus. His practical and inventive genius has contributed many valuable improvements in shipbuilding, such as the utilization of steel bits as ventilators. In conclusion, it may be said that professionally Mr. Hichborn is always kind and sympathetic in his treatment of his subordinates and is ever ready to recognize their merit. He is a thorough master of his profession, and has won the respect and confidence of his men, and, without requesting it, he has at all times received the full measure of praise from the various Secretaries of the Navy as the result of his excellent management and executive ability.

GLAZED BOOK PAPER BAD FOR THE EYES.

The effect of glazed papers on the eyesight has recently occupied the attention of some German doctors. One authority examines the causes of the changes in the general reading and writing habits of the nation, and explains that in the earlier part of the century the old rag papers then in use, both for writing and printing purposes, were mostly of a dull gray or blue color, and were coarse-grained, so that thick letters had to be used by writers with quill pens or by printers on their old slow presses. With the introduction of more modern fibers, paper received a smoother surface, steel pens could be employed, and the printing paper could travel over quicker printing presses. The fashion for brilliant colors and elaborate typesetting has been carried to such a state of perfection that a reflection is often created which could never arise from the rougher surface. Now, what is the effect upon the reader's eye? In the old books or letters, with a mild and soothing light, the surface contrasted easily from the thicker and darker type or writing characters; now the highly glazed surface offers reflections of the light which, with the more elaborate and thinner type, produce a lot of shades and lights that are most trying to the eye. The paper has often to be turned in various directions to be seen more clearly in order to distinguish the gray (or, may be, other shades) of the type from the shining white of the paper. This is similar in effect as to the result of trying to decipher writing in the dusk. An experiment would soon prove this. Take an old edition, say, of Shakespeare, and a new magazine on highly glazed paper, and compare the sensation in the eye after half an hour's reading. The doctors, therefore, propose that the public inspectors of schools should order the use of sanitary paper for the eyes, by which they mean that a glazed or highly polished surface should be avoided, and the colors chosen should rather be gray or light blue, but no white, and in fact, no brilliant colors at all. The type should be clear and simple, and not too thin. The children, whose eyes require protection, and

through them the parents, should be taught to demand their favorite books and papers to be printed in the right style, and the excesses of a falsely guided taste should be avoided. It is suggested that a few years of such policy would soon improve the eyesight.—Invention.

RADIOGRAPHY AND THE PHYSIOLOGY OF THE HEART.

M. Bouchard, at a recent meeting of the Academy of Sciences, reported some observations he had made upon the thoracic organs by means of the X-rays. Among other things he has been enabled to assert the existence of a marked dilatation of the auricles when the intra-thoracic blood-pressure is raised during inspiration. This condition is artificially brought about by endeavoring to inspire with the glottis shut, and is naturally brought about by the violent inspirations during a paroxysm of whooping-cough. M. Bouchard has also discovered that a clear horizontal space exists during forced inspiration between the shadow of the heart and that of the diaphragm, but during normal inspiration there is no space visible. This phenomenon, which is remarkable considering that the diaphragm and the pericardium are attached to one another, is explained by M. Bouchard in the following way. During the forced descent of the diaphragm in a large inspiration the inferior surface of the heart is in contact with the diaphragm to a very limited extent. The pericardium tucks itself into the space existing between itself and the heart, forming in front and behind a gutter into which in turn the pulmonary tissue is packed, thus forming a layer of tissue much more penetrable by the X-rays than those which make up the heart and the diaphragm.—Lancet.