



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE DESTRUCTION OF THE BATTLE-SHIP "MAINE"

BY REAR-ADMIRAL GEORGE W. MELVILLE, U.S.N. (RETIRED).

PREFATORY NOTE

PROBABLY no act of the late Thomas B. Reed so commended itself to the judgment of the thoughtful and conservative element of the country as the determined stand taken by him as Speaker of the House of Representatives during the third session of the Fifty-fifth Congress in resisting the purpose of various interests to compel the Congress to direct President McKinley to use armed intervention, if necessary, in forcing the Spanish Government to effect immediate and important reforms as regards the colonial administration of the Island of Cuba.

Mr. Reed believed, and subsequent events confirmed this conviction, that the condition of affairs in Cuba had been exaggerated and that the Madrid authorities, realizing the deep sentiment in America concerning the question, would substantially yield every demand based upon humanity and justice.

The action of Mr. Reed was founded upon equity, common sense, and patriotism. He appreciated the fact that due to climatic, racial, and financial reasons the problem of administering the internal affairs of Cuba was an exceedingly complicated and difficult one. It was only by reason of the deplorable destruction of the *Maine* that Mr. Reed was prevented from helping to bring about a more satisfactory condition of affairs in Cuba and a better permanent understanding between Spain and the United States.

The suggestion that the cause of the destruction of the *Maine* could be attributable either directly or indirectly to the action of the Spanish authorities seemed incredible to a man of Mr. Reed's training and temperament. Viewed from a moral, diplomatic, or military standpoint, the countenancing by the Spanish authorities of the destruction of the vessel was incomprehensible, since such action could only result in the loss to Spain of all its American possessions. The theory that any individual or collection of men could have planted an explosive mine contiguous to the best berthing buoy in the harbor of Havana without the knowledge of either the military or naval authorities of the port seemed to him to be beyond the probability of successful accomplishment.

The investigation of the matter in such a manner that would commend itself to other nations appealed to him as a matter of justice. It was common rumor that he regarded the subject as one of international import, since it was his conviction that the explosion was due to causes inherent in the design, construction, and operation of a modern battleship.

In furtherance of a deep-seated purpose to undertake a closer study of the matter as an important public duty, Mr. Reed wrote to Rear-Admiral Melville, then Engineer-in-Chief of the Navy, concerning the latter's views as to the cause of the destruction of the *Maine*. The reply of Admiral Melville is contained in the following letter and is deemed of importance as representing the views of an exceedingly large contingent of thoughtful officers of the American navy. It was written about nine years ago and represents extended and thoughtful study of the matter by one whose official position permitted him to obtain all possible information upon the subject.—THE EDITOR.

WASHINGTON, D. C., *January 29, 1902.*

DEAR MR. REED,—About a year ago a distinguished Admiral of our Navy, after traveling through Europe and interviewing the naval officials of several countries, declared that practically no experts on the Continent, and but few in England, believed that the *Maine* had been destroyed by the Spaniards. The conclusion that the explosion was due entirely to internal causes was held by many of our friends in Europe. As the opinions of neither Portuguese nor Spanish naval experts were sought, the above decision is that reached by comparatively disinterested parties.

Before giving my reasons why I believe the Spanish officials were guiltless of the charge of committing such a cruel deed, it may be pertinent to mention something about the comity existing between the personnel of the navies of the world. It is an invariable custom for naval officials to give a sincere, courteous, and cordial greeting to every war-ship that enters any of its ports. Once the anchor of any visiting war-ship is down, the stranger is regarded as a friend and particular care is taken that such a guest is not subjected to any indignity or treatment that might mar his pleasure. Even if the visit of the foreign ship had not been desired or previously encouraged by the officials of the port, all resentment ceases when the vessel enters harbor.

There always has been, and must necessarily be, a high standard of honor among the commissioned personnel of every naval service. The nature of their duties brings naval officers in contact with the most cultured and refined of every nation. The traditions of the service are such that even at an early age the commissioned personnel appreciate the fact that their official conduct, deportment, and bearing are under observation and that, by virtue of their position, all officers of the navy are expected to uphold the dignity and honor of the flag.

From the time a war-ship enters a harbor the naval officials of the port regard the ship's complement as guests and not as passing visitors. There is hardly an instance on record where there has been a failure to exchange official courtesies between ship and shore, and it is seldom the case where some personal hospitality has not been extended to the captain of the foreign ship. The spirit of friendship and respect, pervading every naval service, is such, that the visitor need never be told that the host holds himself personally responsible for his comfort and safety. There is probably no act that will so humiliate naval officials as the subjection of any of their guests to personal violence, even from irresponsible persons. In order to atone for such breaches of hospitality the naval officials of the port will make any sacrifice or expiation that can in honor be demanded.

For twenty years previous to the visit of the *Maine* the Spanish officials had substantially informed both our diplomatic and naval representatives that visits of our war-ships were not particularly desired. It became necessary at times, however, in the performance of duty, for our war-vessels to enter Spanish ports, and it should be said that whenever such visits were made it was the invariable experience that the Spanish officials tried in every honorable way to make their guests welcome. There were many reasons, however, for the friction which existed. Probably the leading cause was the Spanish belief that the Cuban revolutionists had for years been supplied with arms and ammunition by filibustering expeditions illegally fitted out in the United States. It may also be that the Spaniards had not forgotten our sympathy for the several South-American countries that by revolution had renounced their allegiance to Spain.

It will also be recalled to mind that in 1872 the Spanish cruiser *Numancia* entered the harbor of New York. Being in need of repairs, this vessel, through courtesy of our naval officials, was permitted to enter the stone dock at the navy-yard. Just about this time the unfortunate *Virginus* affair occurred. Providentially for us, a canal-boat with several hundred tons of coal sunk in front of the stone dock where the *Numancia* was on the blocks. The sinking of the coal-barge prevented the removal of the caisson, and thus the Spanish armored ship lay helpless in the dock for any destructive work against our ships and harbors.

It is a saying that all is fair in love and war. Probably every naval power would have also rejoiced if, under like circumstances, the most powerful vessel of a possible foe could have been tied up in some crucial hour in such an effective manner. There was not an officer in our service who did not personally sympathize with the commander and crew of the *Numancia* in being deprived of the opportunity to proceed immediately if required to a possible scene of action. Measures were taken to convince the Spanish Government that in no manner could the war-ship's crew be held responsible for her predicament. From the moment, therefore, that the *Numancia* was in position where she could not be used by the Spaniards all manner of courtesies were extended her officials, and the vessel was guarded as carefully as if she were our own. The *Numancia* incident illustrates the manner in which naval officers of every nation may countenance extending the stay of a foreign war-ship in port in times of emergency.

There is every reason to assume that in the winter of 1898 neither the Madrid nor the Havana authorities believed that war was imminent. In fact, to demonstrate its belief that war was not probable, the Spanish Government had ordered the *Viscaya* to proceed to New York. This was before the Spaniards had the slightest intimation that we intended sending a vessel to Havana. With the remembrance of the *Numancia* experience, and realizing that all things were possible to Yankee ingenuity, the Madrid authorities sent the *Viscaya* to an American port. If war had even been thought to have been probable, the Spanish Admiralty must have been convinced that the services of the *Viscaya* would have been lost to them and that in some way she would have followed the fate of the *Numancia*. The importance of this visit at the particular time cannot be too strongly dwelt upon. The official correspondence of both the civil and military Spanish officials, written prior to the *Maine* experience, conclusively shows that Spain did not regard herself as a match for us on the ocean. Her ablest men had almost a full comprehension of the ruin that awaited her, and therefore many of her best leaders were working strenuously to maintain peace and to avert war.

On January 24, 1898, the Havana authorities were unexpectedly told by Consul-General Lee that it was the wish of the Department of State that arrangements might be made

for the friendly visit of the *Maine* to Havana. It was hoped that an interchange of official calls between the commander of the *Maine* and the Spanish authorities would have a tendency to create good feeling. It is a matter of record that the Spanish officials thought otherwise and gave no encouragement to the suggestion. Eighteen hours from the time the request was made, and even before Captain-General Weyler had consented to welcome the visitor, the *Maine* steamed into Havana. The Spaniards were too proud and too courteous to show any expression of regret, but too humiliated to extend any other than the most formal of official courtesies.

The harbor of Havana is small. Its area, to a depth of eighteen feet, is only about one and one-eighth square miles. A small shoal encroaches upon this limited area. Vessels when discharging or loading cargo are compelled to go to wharves or tie to buoys. The entrance to the harbor is only a cable in width. The channel from the inner harbor to the open sea is eight cables in length. There is possibly no harbor in the world whose channel can be so easily and so simply mined as that of Havana. With the aid of the powerful forts on shore, and by mining the channel between the open sea and the inner harbor, the Spanish engineers must have known that the city could never be taken by a fleet and that any mining of the inner harbor was absolutely unnecessary. The Spaniards are great military engineers, and they could not have been ignorant of the fact that the explosion of a massive mine placed within the harbor would destroy the shipping slips and public buildings near the water's edge. Any mines planted by them would have been placed only in positions where they would have imperiled any ships attempting to force entrance into the harbor.

It is a matter of record that the buoy used by the *Maine* was a very desirable one and that Spanish merchant ships had been secured to it up to the time the *Maine* arrived. When this buoy was not in use the harbor master had taken many ships in close proximity to it, for the harbor is so small that he could not have done otherwise. All the lighterage work done in Havana harbor previous to and since the destruction of the *Maine* has been carried on by Cuban and West-Indian laborers. As only a massive mine could have blown up the *Maine*, some 'longshoremen's work would have been required to lay it down. If either soldiers or

sailors had done the work the undertaking would have attracted attention. It is remarkable that no evidence has ever been presented that any work of this nature was done either by laborers, soldiers or sailors around this buoy previous to the destruction of the *Maine*.

It is pertinent at this point to recall to mind the several powerful influences that were making for peace and that would have prevented any Spanish official from even planning the destruction of an American war-ship. The business of the island was practically in the hands of Spanish merchants, and heavy financial loss, if not absolute ruin, imperiled the commercial and maritime interests by a declaration of war. Both the military and naval leaders in Cuba recognized the fact that the island would be lost to Spain if hostilities commenced. The Spanish official correspondence of both civil and military leaders in Cuba proved that these men fully realized the inevitable outcome of any conflict with the United States and that they plainly presented to the Madrid authorities the disadvantages under which the Spanish forces would labor in attempting to hold the island. These officials had positions of honor and trust, and if no higher motives would prompt them to prevent war the loss of high salaries and substantial perquisites might have impelled them to continue existing conditions. The holders of the Cuban bonds were working for peace. Powerful financial forces were working upon the several Courts of Europe to offer their good services in bringing about amicable relations. In the United States nearly all in official authority were working strenuously for peace, and the Spanish Minister, Señor Dupuy de Lome, thus reported to his Government. The Speaker of the House held in check the extremists of both parties, and it was fully understood that no resolution which would have a tendency to provoke war would receive consideration at his hands. The Secretary of the Navy was an advocate for peace, and the disposition of the ships under his command was so arranged as to give the least offense to the Spanish authorities. The country believed that the policy of President McKinley was a very conservative one, and confidence was expressed that by discreet judgment and tactful diplomacy our Chief Executive would be able to arrange some compromise whereby the honor of both countries would be maintained.

The laying down of a great mine near one of the most im-

portant buoys in Havana harbor could only have been successfully accomplished by some military or naval expert possessing special knowledge of the power and effect of explosives. It is inconceivable why some participant who had knowledge of any guilty transaction has not given evidence upon this point long before this. For over three years the Government of Cuba has been practically administered by our military authorities, and the revenues of the island have been at the command of American officials to gather testimony as to whether or not Spanish officials were directly or indirectly concerned in the transaction. It is also important to note that the administration of affairs in Cuba has been severely attacked in the Spanish Chamber of Deputies. The opponents of General Weyler have been so anxious to secure his downfall that they would not have hesitated to show up the guilty parties who blew up the *Maine* if any evidence was within reach that would have implicated any of General Weyler's favorites.

The history of the world shows that amidst the gloom and bitterness of defeat men's tongues are loosened and that the populace who have suffered reverses are keen to seek charges against former rulers and administrators who have brought the country to disaster and humiliation. Not a single Spanish official has ever yet been specifically, or even indirectly, accused of this grave act. There were times, after the destruction of the *Maine*, when the Spanish soldiers were without pay and when they were on limited rations. While enduring even injustice and suffering, is it possible that subordinates would have kept quiet if they had known anything that would have condemned their leaders who were presumed to be living in luxury and ease while the rank and file were hungry and ill-clothed?

If the *Maine* was destroyed by a submarine mine, what became of the fragments of the shell of the mine? It is to be presumed that our divers received special instruction to look for such evidence. The morning after the explosion our flag was hoisted over the wreck and we maintained possession until a day or two before war was declared. Absolute respect for the extraterritorial rights of the United States as to the possession of the wreck was admitted by the Spanish authorities. Their naval experts were, therefore, prevented from examining the interior of the vessel until after General Lee vacated his post under instruction

from the Secretary of State. The recognition of our sovereignty under such circumstances is presumptive evidence of the Spanish belief that official investigation would acquit them of complicity in the affair.

As a matter of interest, if not of direct importance, it will not be amiss to tell something of the actual luck and success that the Spanish officials secured in laying down submarine mines in several of the Cuban ports. The channels leading to Santiago and Guantanamo were mined by the Spaniards, and the unreliability and worthlessness of these contact mines were absolutely and conclusively shown. Upon the capture of Santiago, the army engineers raised the mines protecting that harbor. An official report of these experts showed that the mines were about as capable of doing harm as so many cylinders of powder dropped into the bay. It was the army engineers who first raised these mines and they are the ones who ought to give the most convincing evidence as to their condition when found.

While cruising in Guantanamo Bay both the U.S.S. *Texas* and the U.S.S. *Marblehead* actually struck such mines with their screw propellers. Can better evidence be afforded as to the crudeness and worthlessness of such contrivance? It has been said that one of the mines thus struck by the screw propeller of one of our war-ships had only been planted a little over four weeks.

For the year succeeding the battle of Santiago our military and naval personnel came in close touch with the Spanish commanders and civil officials. It is the unanimous testimony of all our officials that during the war Spain had in Cuba a class of military and naval officers who were men of honor and who upheld the best traditions of a military service. The dignity of these men in defeat, their frankness in conference, their bravery in battle, and the manhood they displayed in the presence of their victors greatly impressed every one. The spirit and strength with which they bore adversity show that they were not only incapable of this crime, but that they would not have countenanced the act being done by any one else.

It will be remembered that the Spanish Commission of Inquiry made official application to both the commander of the *Maine* and to the American Court of Inquiry to make a joint investigation of the cause of the accident. This act showed at least an apparent desire to arrive at the truth.

In the light of after events it seems regrettable that a joint prosecution of the work of attempting to discover the cause was not carried on.

The more study and reflection I give to this question, the more convinced I am that the destruction of the *Maine* was due to an internal explosion. In giving this opinion there is no desire nor intention to reflect either upon the discipline or morale of the ship, nor upon the sincerity of the views of the Court of Inquiry. It is certain that in view of the peculiar condition under which the *Maine* entered the harbor of Havana that extra precautions were taken by her commander and that extreme vigilance was exercised by her crew. The Court of Inquiry pursued its investigation with a full knowledge of the great importance and terrible responsibility that rested upon the individual members. Additional light, however, has been thrown upon the question during the past three years, so that one is justified in now differing with the members of the Court as to the cause of the accident.

Extended investigations show that there have been explosions of magazines and coal-bunkers which have been inexplicable and which took place under circumstances that seemed impossible to account for. Such is probably the case with the *Maine*.

It is very significant that in the history of the American navy explosions on board war-ships have occurred in connection with remarkable events. The first steam-vessel for war purposes in the United States Navy, or in any navy for that matter, was the *Demologos* or *Fulton*. This vessel was designed by Robert Fulton and built under his supervision in New York in 1814 while the war with Great Britain was going on. On the 4th of July, 1815, the *Demologos* made a passage from New York City to the ocean and back, steaming fifty miles in all without any aid from her sails. Robert Fulton died in 1815 before the final touches were put on the vessel. With his death the interest in the vessel abated, and the *Demologos* was taken to the Brooklyn Navy-yard and used as a receiving-ship for many years. On the 4th day of June, 1829, her magazine, containing two and one-half barrels of *damaged* powder used for firing the morning and evening gun, blew up, entirely destroying the vessel, killing twenty-four persons and wounding nineteen others. The cause of the explosion has never been known, although there was a

tale current at the time that it was the deliberate act of a gunner's mate who had been flogged the morning of the day on which the catastrophe occurred. It is also said to have resulted from gross carelessness, survivors stating that the powder was kept in open bags. It was current rumor that a marine sergeant had a desk in the "bag-room," which room was separated from the magazine by a sliding door and that the sergeant used an open light to do his work. Whatever the cause, the destruction was complete and terminated the history of *the first steam-vessel of war ever built*. It would seem as if it ought to have been an easy matter to determine the cause of such an explosion.

It may be now interesting to tell something of the U.S.S. *Princeton*, the first steam war-vessel fitted with screw propellers, and of a gun explosion which took place on board that ship. The *Princeton* was designed by John Ericsson and was completed in 1844. She was exhibited as a marine wonder at various places along the coast. On February 28, 1844, the *Princeton* sailed from Washington on a pleasure and trial trip down the Potomac River, having on board President Tyler and his Cabinet. There was also on board a distinguished party of civil and military officials, invited by Captain Stockton to witness the performance of the vessel and her machinery. The trip down the river was a great success. On the return trip one of those irresponsible persons who are always doing something that ought not to be done, and whose names are never known afterward, wanted to have the big gun known as "Peacemaker" fired again "just for fun." Although Captain Stockton dissented at first, as the guns had been thoroughly exercised earlier in the day, he yielded, however, upon the good-natured wish expressed by the Secretary of the Navy to let the guests have all the sport that they wished. The gun was fired. It burst, injuring many people, among them Captain Stockton himself. The Hon. Abel P. Upshur, Secretary of State, and Hon. Thomas W. Gilmer, Secretary of the Navy, were killed, as were also other distinguished guests. It is to be expected that on board a man-of-war which was carrying such distinguished guests as the President of the United States, the Secretary of State, and the Secretary of the Navy extra precautions would be taken in the firing of the gun, and there is no doubt that unusual care was exercised that day. Nevertheless, despite the special injunction of the officers to ex-

ercise care, the gun did explode. It may be incidentally stated in connection with this accident that fifty years ago a much poorer quality of gunpowder was manufactured and that the gun was probably designed to withstand about fifty times the pressure to which it was subjected. The incident proves that responsibility for explosions cannot be evaded by simply showing that unusual care had been taken to prevent any such accident.

The records of the navy show that we have had several ships which were absolutely and directly destroyed by torpedoes. In the battle of Mobile Bay the monitor *Tecumseh*, while the foremost vessel in line of attack and while advancing upon the Confederate ram *Tennessee*, was destroyed by a torpedo underneath her. The swiftness and character of her destruction may be comprehended from the following extract of a lecture delivered eight years ago by an eye-witness. This witness was Commander Harrie Webster, United States Navy, who, as an assistant engineer, was in the turret of the monitor *Manhattan* in charge of its turning-gear. The *Manhattan* at the time was only two hundred yards distant from the *Tecumseh*. Commander Webster thus tells of the explosion:

"A tiny white comber of froth curled around her bow, a tremendous shock ran through our ship (*Manhattan*) as though we had struck a rock, and as rapidly as these words flow from my lips the *Tecumseh* reeled a little to starboard, her bows settled beneath the surface, and while we looked her stern lifted high in the air with the propeller still revolving and the ship pitched out of sight like an arrow twanged from her bow."

Commander Webster delivered this lecture several years before the *Maine* was destroyed, and it will be noted that he says nothing of flames of fire and the hurling of débris. In the case of the *Tecumseh* the hull was simply ruptured and there was a mighty rush of water which caused the ship to sink almost immediately. Particular attention is called to the fact that the ship was destroyed by an external stationary mine or immovable torpedo.

The Confederate ram *Albemarle* and the U.S. gunboat *Housatonic* were sunk in 1864 by mobile torpedoes. In both cases the hull was ruptured, and the rush of water into the ship was so sudden that the magazines were flooded and thus the explosion of powder and shell was prevented.

In the case of the collier *Merrimac*, during the Spanish-American War, a number of special mines were placed on

the outside of the ship just opposite the machinery compartments. Unusual care was taken by Constructor Richmond P. Hobson in locating these explosives, for he had considerable time to settle upon the most desirable places. Although he attached them to places opposite the machinery compartments, there was no explosion of the boilers or steam-pipes, although steam was on the boilers at the time.

During the war between Peru and Chile in 1879, and again during the Brazilian troubles in 1896, ships were destroyed by mobile torpedoes. In several instances the crews of the war-ships simply deserted, leaving powder and shell in their magazines. Torpedoes were discharged at these abandoned ships or "derelicts." The vessels were sunk, but there is no evidence that there were any internal explosions following the one from without.

The destruction of the *Tecumseh*, *Albemarle*, and *Housatonic*, as well as the sinking of vessels of other navies, conclusively shows that where there is an explosion from without it is the hull that receives the force of the blow and that rupture is followed by the instantaneous flow of water into the magazines, thus preventing interior explosions.

In the history of explosives the whole weight of evidence goes to show that when a war-ship is destroyed either by a mobile or stationary torpedo the flow of water through the rupture is so rapid into the ship that it will be the rare exception when an internal explosion follows. From an engineering standpoint this phenomenon can be accounted for by the fact that there are linings to magazines and that boilers rest on saddles, thus giving just enough cushioning to prevent the shock from being directly transmitted.

In view of the experience of our own vessels, as well as from data secured from the series of five-hundred-pound gun-cotton discharge against Her Majesty's ship *Oberon*, conducted in 1875, it can be stated with a good deal of certainty that had the disaster to the *Maine* been caused by anything but an internal explosion the effects would have been absolutely different from those recorded.

War-ships have been destroyed by explosions from within, and a few comments in connection with such catastrophes may afford evidence that has an important relation to the *Maine* disaster. The British navy suffered the loss of the gunboat *Doterel* from an internal explosion. This vessel was lost in 1881 in the Straits of Magellan. The Admiralty

made an extended investigation of the loss of this ship, for it was believed that the disaster was due to an explosion in the coal-bunker. The final decision has been reached that the explosion resulted directly from the ignition of the fumes from a paint-locker which was adjacent to one of the magazines. Flame and débris were shot upward. The back of the vessel was broken. In fact, the results produced were similar in some respects to those that were observed on the *Maine*.

In November of the same year a mysterious explosion occurred in the paint-room of Her Majesty's ship *Triumph*, resulting in the death of two of the crew and the wounding of eight others.

In 1891 the U.S.S. *Atlanta*, when only one day out of port and during the fury of a gale, had an explosion in her paint-locker from which two men died. The Navy Department made a careful investigation of the affair, a chemist from the United States Torpedo Station at Newport being one of the Court of Inquiry. The evidence adduced showed that it was absolutely dangerous to keep certain shellacs and varnishes below decks. As a result of this accident special tanks are now kept on the hurricane or main decks of our war-ships for holding such dangerous liquids.

There have been numerous instances where the gasoline-tanks of steam-launches and pleasure-boats have exploded. Where these internal explosions occur flame arises and there is havoc within the boat. The result is absolutely different from that which takes place when torpedoes or submarine mines are used to destroy wrecks and hindrances to navigation.

It may be said that where there is an internal explosion masses of flames as well as smoke and débris shoot upward. Where a massive or powerful submarine mine is used columns of water are projected.

The resulting effects to vessels from external explosions have been summarized thus by Admiral Dupont of the French navy:

"Mobile torpedoes, whether launched from a tube, carried in a boat, or intrusted to the current when striking the object, such as a ship, produce a clean rent with slight dislocation. A water-spout is produced, accompanied by dull detonation. The ship remains relatively intact in all parts except those in the immediate vicinity of the explosion. In no case recorded have fire and flames followed."

In the case of the stationary torpedo or massive mine a large and deep hole is dug up. A waterspout is produced and there is a rise to the water that resolves itself into a long wave. To produce any substantial effect, however, the stationary mine must be very large. Time and patience are required to locate it in a definite place. It is hardly possible that such work could be done successfully except in daylight. In the case of the exterior explosion there is neither fire nor flame. It may also be stated that both in the case of the mobile torpedo and the stationary mine all fish in the water for some distance are killed and that the shock is transmitted for a considerable distance.

Where the explosion is within the ship the results are absolutely different from the case where the explosion takes place without the vessel. When the explosion is within, heavy flames arise, débris is scattered, and there is a great mass of smoke shot directly above the vessel. The rupture is great and irregular and havoc is general. When the explosion is from without, the damage is not local, the effect often being noted for miles distant from the scene.

In the destruction of the *Maine* Captain Sigsbee states that there was a bursting, rending, and crashing sound or roar of immense volume, largely metallic in its character. It was succeeded by a metallic sound—probably of falling débris—a trembling and lurching motion of the vessel. The passengers of the *City of Washington*, which vessel was only about three hundred feet distant on the *Maine's* port quarter, declare that a few seconds after hearing the report of the explosion there came forth from the center of the ship a terrible mass of fire and then things went over their heads. The flames were seen a few seconds after the explosion. These passengers were eye-witnesses of the affair, for they were on the deck of their steamer when the *Maine* blew up. One need not have a very deep knowledge of the theory of explosives to understand that since the *Maine* had quite a heavy protective deck, and the magazine was in the bottom of the ship, it required several seconds for the conversion and ignition of the explosives from a solid to a gaseous state. In some of the chemical reactions that were produced it probably required the oxygen of the air to complete combustion and produce flame. This is why the shock of the explosion would be heard at a short distance before the flames would be seen.

The terrible havoc that was wrought to the ship could only have been caused by an internal explosion. The ship, to all intents and purposes, was ready for battle and her magazines were well filled with explosives consisting of powder and shell. The powder and shell in her magazines were of the best character that we possessed. It must not be forgotten that the force of the new modern powders is from four to five times greater than that of the old powders. Although chemists have done much to make the new powders tractable and suitable for ballistic purposes, yet from the very fact that guncotton and nitroglycerine are used in combination in their manufacture, it is evident that there is always danger that the presence of some foreign agent may cause reaction that will produce explosions.

On June 5, 1901, the magazines at the Mare Island Navy-yard exploded. Three minutes after the report was heard a photograph was taken, and the camera caught the volume of smoke or vapor at least a mile high. The photograph distinctly showed that the volume of flame and débris was sent directly upward. The accident at Mare Island proves that the modern high explosive cannot be considered a tractable and safe compound.

It has been claimed that the explosion or shock from without produced a great explosion within the vessel. If shock from without will produce an explosion within, then it may be pertinent to ask why the magazines of war-ships do not explode when the war-vessels suddenly hit projecting rocks, butt into wharves, or crush against each other when colliding. In all these cases there is sudden and violent shock to the frames and plates of the hull. Wherein can the use of the ram be justified in warfare if shock to the hull of a battleship will detonate the high explosives in the magazines. If simple shock will produce detonation of the high explosives, how is it that the blowing-up of a war-ship is not of frequent occurrence?

Only a year previous to the destruction of the *Maine*, while that vessel was in the harbor of New York, she steamed at maximum speed into one of the city docks to prevent her colliding with a passenger-boat filled with people. High explosives within a vessel are not detonated by shock from without, for if they were the modern battleship would be more dangerous to her own crew than to any one else.

Although comparatively few battleships have been de-

stroyed from the explosion of their magazines, yet there is not a sea-going officer who, at some time within his own experience, has not believed that his vessel had been imperiled from such cause. By mentioning a few experiences in our own service we can get an idea of what is going on elsewhere. The magazines of the U.S.S. *Cincinnati* are located between some of her coal-bunkers. Upon one occasion, either from fire in the bunkers or from some other cause, the iron bulkheads of the magazines were heated to such an extent as to actually char and, in some cases, almost completely burn the pine boxes in which the shell were contained. Fortunately the condition of affairs was discovered in time to permit the flooding of the magazine. There is not an officer who was on board the ship at the time who does not believe that the flooding of the magazine compartment prevented the destruction of the *Cincinnati*. This danger has occurred also on two other ships of the American navy, for on board the flag-ships *Philadelphia* and *New York* the magazines were heated to a dangerous condition.

Shortly after war was declared against Spain one of the crew of the U.S.S. *Puritan* gained access in some mysterious manner to the magazine. The mind of this man was supposed to be affected, and as he had previously declared his intention to wreak vengeance upon the ship and her officers, the crew believed that he entered the magazine without authority to destroy himself and the vessel. When interrogated about his action he could give no satisfactory explanation for forcing his way into the magazine. The instances that could be mentioned of commanding officers being apprehensive as to the conditions of their magazines are exceedingly numerous.

One of the principal reasons ascribed for maintaining that the explosion of the *Maine* was due to a stationary mine was the upheaval of the keel. When one remembers that the after part of the ship was comparatively uninjured and the bow appears to be fairly whole the question arises: would it be possible for the fore part in sinking while the after part was water-borne to so bend the thin bottom as to force up part of the keel?

If the *Maine* is ever raised, it will be clearly established whether the bending of the plating was caused in this way or whether the distortion was due to a vertically acting force exerted from beneath the ship.

The wreckage of the *Maine* shows that the vessel was subjected to terrific and various forces tending to her destruction. There were not only direct, but reactionary forces, which tended to distort plates and frames. It has been said that the bow "sunk like a shot," and who can picture the effect of such a mass of material being disrupted from the main portions of the vessel? An explosion which would demolish a ship's sides, separate massive frames, tear loose the protective deck, and break a vessel in two must have been exerted in every direction. If it was an internal explosion, then it would also tend to drive the double bottom downward. As the mud was but a few feet beneath the keel there might have been a recoil of reaction when the ship struck the bottom, thus causing the keel and lower plates of the hull to buckle.

A point that will always militate against the submarine theory is that no considerable body of water was thrown up by the explosion. It was no moderate charge of explosive which destroyed the battleship, and any excessive amount exploded in a harbor whose depth did not exceed thirty feet could not have failed to have sent forth great volumes of water. Is it not also possible that the explosion might have occurred in this wise? At first a small explosion or detonation would take place in part of the shell-room or in some corner of the magazine. The conversion of a great mass of solid explosive to a gaseous state would tend to exert pressure in all directions. That part of the pressure exerted downward might disrupt the hull and deliver the whole contents of the magazine to the opening. Then when the remainder of the powder and shell exploded a part might be exerted in throwing the ship up while the other part would tear up the whole interior arrangement.

In the several magazines of the *Maine* there were different size shell and various kinds of powder. It is possible that some of the shell had been loaded some months previous to the disaster. It therefore took variable times for the different kinds of powder to burn and explode, and no one is capable of telling or even imagining what did occur.

The harbor of Havana at this time was regarded by navigators as a very unhealthy and unclean one. The city refuse was not carried far enough to sea to prevent it being deposited in the harbor. The water was very much discolored and it was impossible for the divers working on the wreck

to distinguish objects except in a very indistinct manner. They therefore had to exercise their senses of touch in coming to conclusions. Expert testimony of this description requires confirmatory proof to establish its directness and completeness.

The divers at work beneath the wreck also testify that there was a confused mass of material and that the tangle of jagged plates and ship's fittings made it very difficult for them to prosecute their work. They maintained that it was dangerous for them to move amongst the wreckage, for the sharp edges of projecting plates and angles were liable to cut the life-lines and air-tubes. Extra precautions had to be taken to prevent their rubber suits from being punctured. The evidence upon material points cannot be regarded as positive and authentic, for the disadvantages under which the divers labored could easily cause them to be mistaken as to details.

The effect of boiler explosions ought to furnish some substantial evidence as to the cause of the blowing up of the *Maine*. The majority of boilers in use are simple cylinders, and it would seem that an explosion from internal causes would simply disrupt the plates, thus permitting the steam and water to escape. The practical results are quite different. Not only is the shell ruptured, but at times the plates are rolled over each other and all manner of contortions are produced. It is often the case that the boiler appears, after one of these explosions, as if some heavy weight had fallen upon it. The condition in which boilers are found after explosions cannot be accounted for by known laws. There are instances where the boiler has been blown through the roof of a building; there are other cases where the shell has gone through the sides of heavy walls. The boiler has even been projected downward until it has been imbedded to some extent in the earth. The effect of boiler explosions has been everything from the simple escape of steam to the complete destruction of massive buildings.

Experience shows that when an explosion occurs from within it is possible for the shell of the structure, whether it be a tunnel, building, tank, or boiler, to be so damaged that the cause could be ascribed to any number of possible combinations. When the explosion is from without, the breach is purely local and the wreck of the explosive can be definitely traced.

It has been stated that the bow of the wreck of the *Maine* has shifted its position very perceptibly. In view of this fact, it is possible that after the hull of the *Maine* was materially injured the bow broke off and as it sank it shifted its position due to the character of the bottom of the harbor at several points. The fact that the bow is at an angle with the stern may be accounted for by the fact that the tide had something to do with this change in position.

As this country officially disclaimed that war with Spain was waged on account of the blowing-up of the *Maine*, and as it is not possible even in the naval service to induce men and officers to use the cry of "Remember the *Maine*," this nation can very consistently view the whole tragedy in the light of events that occurred before, during and since the war.

We now have a higher appreciation of the character and manhood of Spanish soldiery. The courage of Admiral Cervera and his officers and crews in going to inevitable defeat in an effort to uphold the honor of their flag conclusively shows that such men were not guilty of deliberate assassination. The Spaniards showed during the last war that they could die as soldiers should, and such men would neither countenance nor would they take part in any act that was unworthy of a true soldier in arms.

GEORGE W. MELVILLE.