SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico $3.00
One copy, one year, to any foreign country, postage prepaid. £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845)........ ....$3.00 a year
Scientific American Supplement (Established 1876) .... 5.00 "
Scientific American Building Monthly (Established 1885)........ 2.50 "
Scientific American Export Edition (Established 1878). .... 3.00 "
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MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, APRIL 23, 1904.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE BATTLESHIP "MISSOURI" DISASTER.

The awful calamity that befell the battleship "Missouri" on Wednesday, April 13, when she was engaged in target practice off the port of Pensacola, is the latest of a series of similar accidents which have occurred within the past few years on our own and foreign warships. Some eighteen months ago, while the Russian battleship "Sissoi Veliky" was firing her forward pair of 12-inch guns, there was a terrific explosion, which killed every man in the turret, and completely wrecked the interior of the same. The massive top of the turret was blown bodily into the air, and half of it, falling backward upon the deck, killed twenty-eight men that were standing there in a group. About six months later there was an explosion during target practice in one of the turrets of the 12-inch guns of the British battleship "Mars," which resulted in great loss of life. Then followed the fatal explosion in one of the 8-inch gun turrets of our own battleship "Massachusetts." In each case it was impossible to determine definitely what was the cause of the explosion, the various boards of inquiry being able merely to suggest various conditions which might have rendered the explosion possible. In the present case, because of the fact that every officer and man that was in the turret of the "Missouri" was killed, it is likely that the disaster will have to be written down as one of the unexplained mysteries of which there are so many to be recorded in the history of the use of explosives both on sea and land. The least that we can say for the unfortunate dead is that at the present writing there is not the faintest shred of evidence that these noble fellows were doing aught but discharging their duties with that intelligent care and conscientious fidelity which have won for our navy its high reputation throughout the civilized world. Such accidents as these are a part of the perpetual risks which are taken by those who serve their country on the high seas—risks that are by no means confined to the hour of battle, but are present and are always seriously contemplated by officers and men when ammunition rooms are opened, guns are cast loose, and the terrific weapons of modern warfare are put to the test.

Most earnestly do we deplore the unseemly and officious haste with which such a large section of the press seem ready to rush into an ill-timed and most ungenerous suggestion of carelessness and incompetence, almost before the victims have breathed their last breath in obedience to the call of duty. Whether on the Russian "Sissoi Veliky," the British "Mars," or the American "Missouri," the victims of these shocking disasters are as fully entitled to the honors of naval heroism as if they had died in the fiercest climax of a great sea fight.

The board of inquiry, when it comes to investigate, will carefully sift out what scanty evidence is forthcoming, and if there be any blame, we may be assured it will be rightly placed. But just now it looks as though the only criticism that could be made is that the accident may have happened through the rapidity of the firing. If this is the case, it will simply mean that our gallant sailors have died because they were striving for that very proficiency in the handling of their guns, which it has been the effort of our own and foreign navies to promote to the highest degree.

The accident happened to a modern 12-inch 40-caliber gun of the latest pattern built for our navy These guns are probably the most effective 12-inch guns in existence to-day, having a greater energy per weight of gun than any 12-inch pieces at present in use in any navy. It should be distinctly understood that the accident is in no way attributable to the gun itself. Briefly stated, what happened was as follows:

The left-hand gun, which had already been fired several times during the target practice, was being loaded, and the projectile had been rammed home, together with two of the four 90-pound bags of powder which go to make up a 360-pound charge. The projectile, therefore, was in place, two bags or 180 pounds of powder were rammed up snugly against the base of the shell, and two other bags were in line with the breech of the gun and about to be rammed home, when the first half of the charge that was in place suddenly ignited (nobody knows nor probably will ever know why or how) and the gases, rushing out of the breech, ignited the 180 pounds of powder still remaining in the charging tray. This, of course, produced an enormous mass of flame and heat, and probably portions of the burning powder fell through the well, which opens through the floor of the turret, down to the handling room below. On the floor of the handling room were four charges, or about one and a quarter tons, of powder, which was immediately ignited, and added its awful volume of flame to that of the burning mass above. There is a mournful consolation in the certainty that in the suffocating fumes and fearful heat of that conflagration the death of the twenty-nine officers and men must have been practically instantaneous.

Among the many explanations of the disaster, it has been suggested that there may have been what is known as a "back blast." That is, that when the breech was opened, a certain amount of unburned gases, remaining in the gun after the previous discharge, were blown back through the breech, and meeting with the oxygen of the air, ignited. The "back blast" is not an uncommon occurrence during the firing of big guns, especially if the wind is blowing toward the muzzle of the gun; but the flame produced is instantaneous and not very fierce, the officers being able to stand within a foot or two of the flash without suffering any harm. It is difficult, however, to understand how this could have caused the ignition of the charge; for when the breech is opened the ammunition carriage is, of necessity, some distance below the breech of the gun, being at the time on its way up from the handling room below, so that if there was any back blast, it must have happened several seconds before the powder was hoisted to the breech of the gun, and in that interval of time the gases remaining in the gun would probably have cooled down below the ignition point, and the danger would be passed. Furthermore, the shell had been rammed home into place at the forward end of the powder chamber, and its copper rifling band was practically sealing up the bore. That there was any burning fragment of the "canvas" bags, in which the powder of the previous round was held, remaining in the gun, is extremely unlikely, for the reason that the so-called "canvas" is made of pure wool, to insure its immediate combustion when the charge is fired, and the fierce white heat of the gases in the powder chamber at the instant of explosion is such that every fragment of the bag is instantly consumed. Furthermore, the breech box, powder chamber, and bore of the gun are drenched with a powerful spray of water between each round. From the above considerations it will be seen how difficult it is to connect the explosion of the smokeless powder with the ignition of left-over gases or burning fragments from the previous round. As we have said, the disaster is at present a profound mystery. It is very doubtful if the forthcoming investigation can do much to solve it.

THE ADVANTAGES AND DRAWBACKS OF TURBINES FOR OCEAN STEAMERS.

Further particulars of great interest that have come to hand regarding the report of the turbine commission will, in some respects, cause considerable surprise. In the first place, it was found that, contrary to the generally accepted belief that there would be a considerable economy of weight in the turbine as compared with the reciprocating engines, the use of turbine machinery to develop the 70,000 horse-power required for the new Cunarders will mean a saving of only 300 tons over the weight that would be required if reciprocating engines were used. This statement is rendered the more significant when we learn that the commission advised the steamship company not to rely upon this saving by adding 300 tons to the cargo or other accommodations, but rather to hold it in reserve to be incorporated in the motive power, if need be, as the designs of the turbine machinery are worked out.

The commission admit that the most important disadvantage of the turbine is the lack of economy at low speeds; but they consider that, as the new ships will always run at a uniform speed of 24½ knots, this consideration does not enter into the problem. They state that because of the high sustained speed, the turbines may be depended upon to realize their best economy, and the coal and steam consumption will be superior to that of reciprocating engines. At the same time, it is surprising to learn that, although the tests made on land between reciprocating and turbine engines when both were engaged in driving electrical generators showed a marked superiority in economy for the turbine, especially where superheated steam was used, the tests made in the English Channel between a turbine-propelled vessel and one driven by reciprocating engines showed a superior economy of only two per cent in favor of the turbine. Marked economy, however, is predicted for the large turbines because of the great reduction of the staff in the engine room, and of the small amount of lubricating oil used, and the absence of this oil in the exhaust steam.

The arrangement of the power on four shafts will provide two steam units, each with one high and one low pressure turbine; and should there be any breakdown of one shaft, turbine, or propeller, it would be possible to continue under the three remaining shafts. But for the reason that the turbine can carry a much greater overload than the reciprocating engine, it will be possible to reduce this twenty-five per cent of lost power so very materially that the speed would probably not fall more than a mile or a mile and a half per hour below the normal speed; that is to say, one of the new turbine boats would be capable, if she fractured a shaft, of proceeding on her voyage at a speed of from 23 to 23½ knots an hour. Here alone is a great gain in efficiency which, in itself, we think is sufficient to guarantee the very radical step which is about to be taken.

EXPERIMENTS MADE AT THE LABORATORY IN THE CATACOMBS; EFFECT OF DARKNESS UPON ANIMALS, ETC.

M. Armand Viré gives an account of some experiments which have been carried on at the biological laboratory of the Catacombs. The laboratory was installed in 1896 for the purpose of observing the influence of light and darkness upon different animals. It has two distinct parts, one of which is underground and is located in that part of the Catacombs lying under the Jardin des Plantes, while the second part consists of an aquarium building in the Zoological Gardens. In the first portion the experiments are carried out upon animals which are constantly kept in the dark. On the contrary, it is the subterranean animals which are observed in the second part, and they are exposed to daylight in order to study the modifications which may be thus brought about.

Regarding the normal animals which are kept in the dark, these are especially the Crustaceæ, Batrachians, and different varieties of fish. The crustaceans (*Gammarus fluviatilis*) showed the following phenomena: The gray pigment disappears by patches which increase in size until the entire disappearance of the color. The eye remains normal at first, but after a year it becomes slightly modified in the forepart, although upon dissection no change is remarked in the retina or the optic nerves. On the contrary, the organs of smell, touch, and taste show a marked hypertrophy at the end of a few months. Their length increases gradually until the organs have their dimensions tripled. The observations seem to show that the organs which are now useless, such as the eye, tend to subsist for a considerable time, and this explains in a certain degree the presence of these residual organs in a number of animals, and which could not be accounted for except by this conservative action of the organism. The parts which now become more useful, such as the hearing, touch, and smell, owing to the disuse of the eye, take at once a development which accords with their increased functions.

In the case of the fish a singular phenomenon was observed. After remaining for five years in the dark, the eye of an eel increased in size until it became double its usual volume. This fact would appear to be in contradiction to the preceding, if it is not remarked that the optical nervous system is somewhat reduced, showing thus that the hypertrophy of the external organ will no doubt give place later on to an atrophy. This fact has been observed as far back as 1831 by Eudes Deslongchamps, upon an eel which was taken from the bottom of a well. Another fact remarked in connection with the fish is a reduction of the length in the dark. In the case of twelve gold cyprins (*Carassius auratus*), six were placed in the Catacombs and six in the light. The food was the same for the two portions. After two years the specimens kept in the dark changed their color to a pinkish white. Their length became only one-half that of the second lot, which retained their fine red tint.

The subterranean animals which were kept in the light in order to observe the modifications which might occur were mainly crustaceans (*Niphargus Plateaui*, obtained from the Catacombs and elsewhere; *Vireia burgunda* and *V. berica*, from the Italian caves), and batrachians (*Proteus anguinus*, from Austrian caves). The crustaceans lack the eye and optical nervous system, that is, all the organs which are capable of receiving luminous impressions. The latter specimens have the eye atrophied and covered by the general tegument. Nevertheless, all the specimens are sensitive to light and show by very distinct reactions that light is disagreeable to them. This is probably not a direct perception of the light, but a sensation of a chemical order which is transmitted from the pigment cells to the brain by the general nervous system. In fact, after several months experiment, the Proteus commences to assume a color; at first this is light and diffused, then it becomes darker, ending in a violet black.