

### THE GERMAN MARINE RESEARCH BOAT "PLANET."

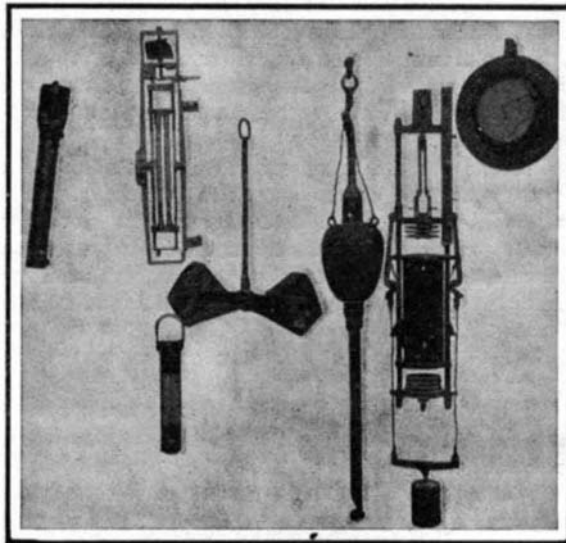
BY HERMANN ALBRECHT.

His majesty's ship "Planet" started on her first cruise on January 21 of the present year. She is fitted out richly and most judiciously for her peaceful mission. This is to consist not merely of coast measurements in the South Sea; her commander has been given a great scientific programme of work to perform, which is to be carried into effect in part on the carefully-chosen outward passage to the South Sea. The ship's route lies by way of St. Helena, Capetown, Madagascar, Mauritius, Ceylon, and Batavia. Many of the instruments and methods of work to be used are among the most recent known.

One task is to investigate the higher atmosphere over the ocean. The conditions prevalent here are known only through a few observations made in the North Atlantic, which go to show that these conditions are not as simple as theory has heretofore assumed. A number of kites fixed one above the other and attached by lines of fine piano wire are used. The movement of the ship alone is sufficient to raise the kites in an almost perfect calm, as was shown on board the gunboat "Sleipner." The top kite, which under favorable circumstances may reach a height of 26,000 feet, is provided with a meteorograph, an instrument, weighing about 2 pounds, which during the rise and fall of the kite, registers the time, temperature, dew point, velocity of the wind and air pressure continuously, the last of these indicating, at what height each registration occurred. The meteorograph may be carried still higher, to a distance of nearly 47,000 feet, by a system of two connected hydrogen balloons, one of which inflated more tensely than the other, bursts in the rarefied air at a determinate height, while the other balloon, acting as a parachute, carries the instrument carefully down until the float, which is attached to it below, touches the surface of the sea. The balloon remains in the air at a height of about 160 feet above the float and in this way indicates the whereabouts of the instrument to the ship. Then, finally, there are small balloons which are liberated without instruments and which give indications by their flight, of the direction and force of the wind. Since the "Planet" is to cross the region of the trade winds, monsoon, and calms, most manifold and interesting results are to be expected from the observations to be made.

Other researches lead down into the depths of the sea. The "Planet" is provided with the same deep sea sounding apparatus which was used on the German research boats "Valdivia" and "Gauss." Deep-sea measurements are to be made at specially interesting points, thus on the eastern boundary of the great bank which traverses the Atlantic Ocean in an S-shaped course, where the indentation of the sea bottom below the surface of the sea is greater in some spots than the height of the highest terrestrial mountains. Among the instruments of more recent construction carried by the "Planet" are a deep-sea man-

ometer which determines the depth of the ocean from the pressure of the water at the bottom, a deep-sea water scoop, Richter's dip-thermometers, the mercury column of which breaks off on contact with the sea

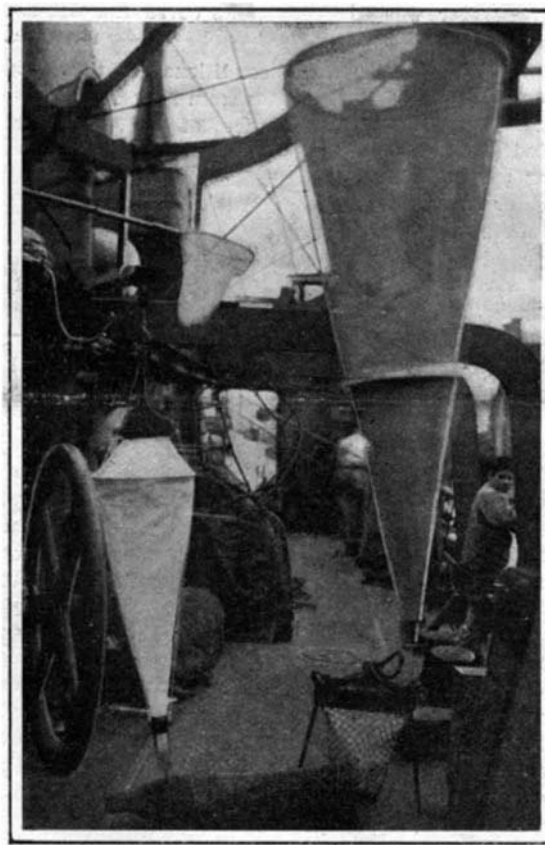


Various Instruments Used in Deep-Sea Observations.

bottom and thus allows the temperature which reigns here to be registered, and the scoop made according to the ideas of the Prince of Monaco, by means of which about a quart of the sea bottom material may be obtained. There are also instruments on board to de-



A Phototheodolite for Measuring Wave Lengths and the Coast Line.



Deep-Sea Sounding Apparatus for Capturing Specimens of Deep-Sea Life.

termine the percentage of salts, the color and the transparency of sea water, others to determine the percentage of gases, phosphoric acid, silicic acid, and plankton, the finely-divided organic material which represents the primordial nourishment in the ocean.

For the measurements themselves the new stereophotometric method developed chiefly by Dr. Pulfrich is to be employed. Two phototheodolites from the firm of C. Zeiss, in Jena, were mounted on board ship at a distance of 156 feet from each other. They are provided with two photographic cameras, the plates of which may be brought into exactly the same plane. The differences between the two pictures obtained at the same moment are noted by a special measuring instrument, the stereocomparer, which makes it possible to take measurements in all dimensions of the region photographed. According to the same method photographs and exact measurements of ocean waves are to be made on board of the "Planet."

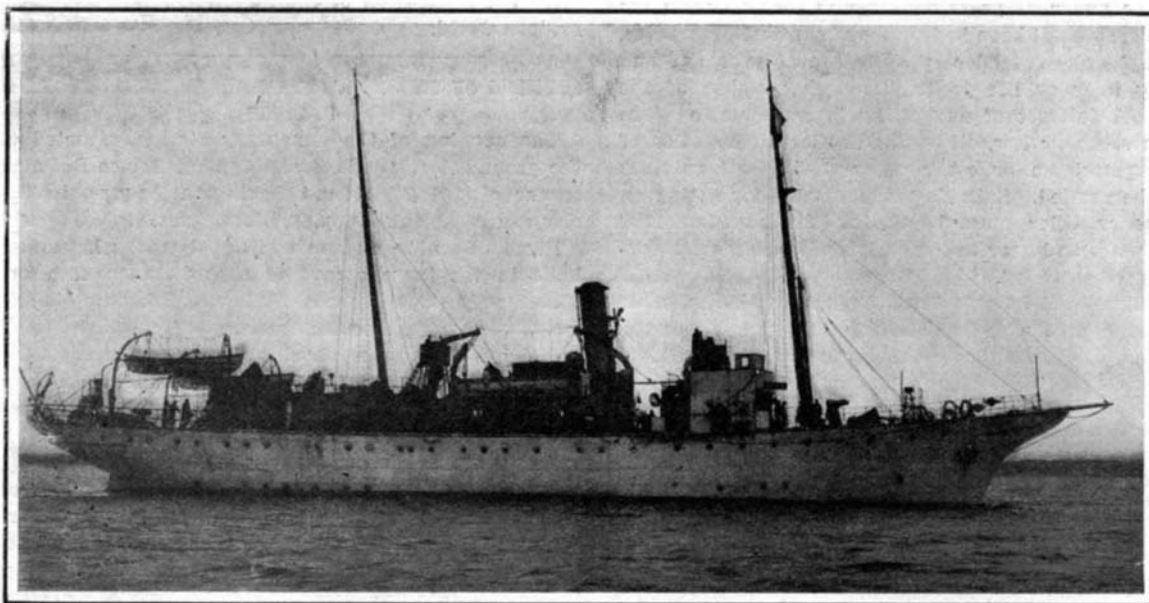
In order that all the works on board ship may be facilitated to the utmost, especially in the tropics, she has been provided with large airy staterooms and working cabins. The doubts of the vessel's seaworthiness which her style of construction caused to be raised, were completely dispelled by her trial trips in the North and Baltic seas.

#### Formation of Fine Pearls.

Mons. Seurat has just returned from a mission in Oceania, says L'Illustration, where he made a special study of the method of formation of fine pearls. His conclusions shed new light upon a question hitherto rather obscure, and seem to indicate the way to be taken for the artificial production of the natural pearl. While the Hindoo legend attributes the origin of the pearl to the fall of a drop of dew into the bosom of an oyster gaping in the sun, modern scientists have long believed that the pearl results from a secretion

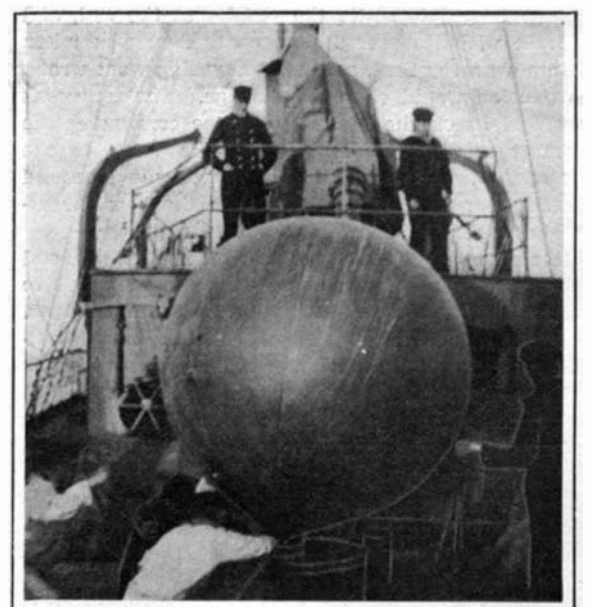
consequent upon the irritation produced upon the nerves of the mollusk by the introduction of a foreign substance, a grain of sand or other. For a long time the Chinese and the Japanese have thus manufactured so-called genuine pearls. They introduce into the very heart of the oyster small bodies, around which another gradually comes to model itself. Attempts of this sort have been made in France. But it seems to be admitted that the concretions thus obtained are not pearls, they are mere mother of pearl. According to another theory, a certain disease of the oyster determines the formation of *calculi* or "stones," which an equally morbid secretion envelops in pearl-matter. A good many pearls from Ceylon inclose a minute nucleus, the presence of which agrees with this theory. But all pearls do not present this phenomenon; the theory must therefore be discarded.

A parasitic origin appears today as good as demonstrated. Already Prof. Raphael Dubois had attributed the formation of pearls in the mold to the presence of a larva. During his stay in the Gambier Islands (1902-1904) Mons. Seurat decalcified pearls and he found at the heart a nucleus not formed by a "stone," but by the worm of the *tylocephalum*, which is a parasite of the oyster. At the same time it was noticed that the majority of pearls gathered loose in the oys-



The "Planet" Equipped for Meteorological Observations at Sea.

THE GERMAN MARINE RESEARCH BOAT "PLANET."



Balloon Used for Raising Instruments to High Altitudes.

ters of Ceylon contained the remains of a worm. On the other hand, it is known that certain larvæ hatched in the cells of any given animal can continue their evolution only by passing into the stomach (if one may thus express oneself) of some other animal. The best known example of this phenomenon is furnished to us by tape-worms. Now in the present state of microbiological science it is accounted that this parasite of the oyster must accomplish its development in the eagle-ray, which pierces the oysters with its spine in order to imbibe the larvæ which prey upon it, and among these last the larvæ of the pearl. The knowledge of these facts therefore would allow contriving a process for supplying the oysters with the valuable larva while preserving them from the attacks of the eagle-ray. Mons. Seurat thinks it well to call attention to the fact that it is not the parasitic organism of the heart which causes the pearl to live and die. According to him the pearl tarnishes on contact with sweat and other secretions, with dirty or soapy water; it is restored by having the superficial layer dissolved in an acid, which constitutes a delicate operation. Gastric juice possesses for this purpose peculiar properties well known to California ladies who have their tarnished necklaces swallowed by hens whose digestion is carefully watched. These assertions of a scientist scarcely agree with the often-received idea that frequent contact with the skin of a pretty woman is required to preserve the "water" of pearls. We might at most "distinguish" and assume that certain shoulders possess the same properties as the stomach of hens.

More than eight years have elapsed since China

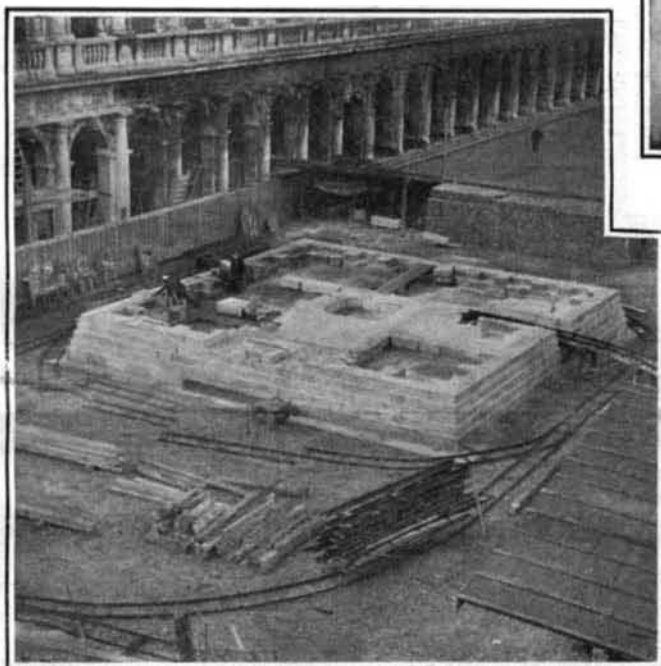
#### THE REBUILDING OF THE CAMPANILE AT VENICE.

The group of photographs which we publish, showing the progress of the work of reconstructing the campanile at Venice, affords gratifying evidence of the fact that this most prominent feature in the best-known views of Venice is destined at an early date to lift once more its tall and stately beauty into the blue Venetian sky, as it had done for over one thousand

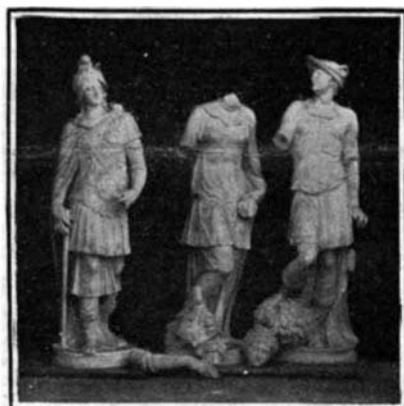
injured, and it will form the core or nucleus of the new foundations. That the substructure of the new tower will be absolutely secure against uneven settlement, and probably against any settlement whatever, will be evident from a consideration of the methods adopted to enlarge and solidify the foundation, all of which will be clear from a study of the accompanying vertical section through the foundations and the lower portion of the tower. In the first place, then, the total weight of the structure, because of the more modern method adopted in its construction, will be largely reduced, and at the same time the total area of the foundation has been about doubled. This has been effected by driving around the old piling, which was only 7 feet in length, several inclosing rows of piling, all of which will be 15 feet in depth. These piles have been put down in close contact with each other, each succeeding row being driven snugly against the one preceding it, the piles being driven from the outside toward the center, with the object of compacting the clay underlying the present foundation, and thus giving them additional support. In the square of new piling there are in all 3,000 piles. They were cut off at the same level as the old piles. The outside courses of the old foundation masonry were then removed for a certain distance inward over the old platform, and entirely new masonry has been built around this core, extending out over the whole area of the platform. It will be seen from this description that the question of future subsidence has, in all human probability, been entirely removed. Above the street level, the foundation is carried up in five steps to correspond with the five steps which, when the building was orig-



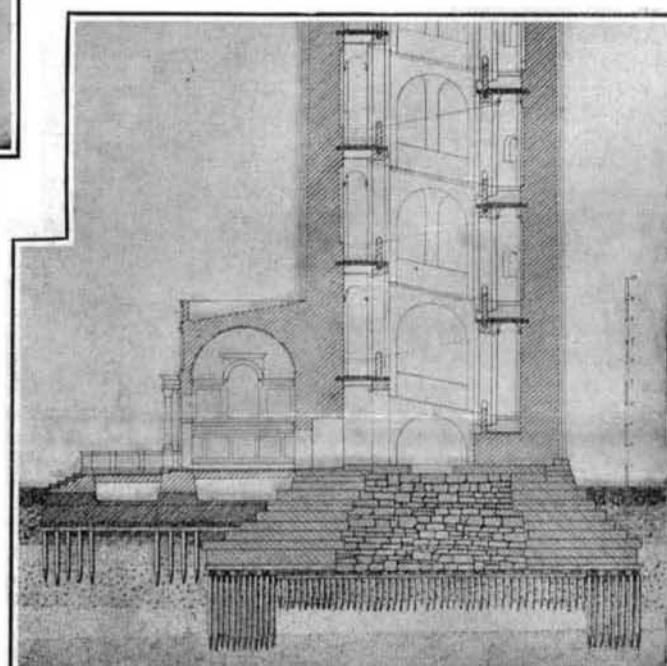
Madonna and Child, Restored from 1,600 Fragments.



The Restored Foundations, Ready for the Erection of the Brickwork.



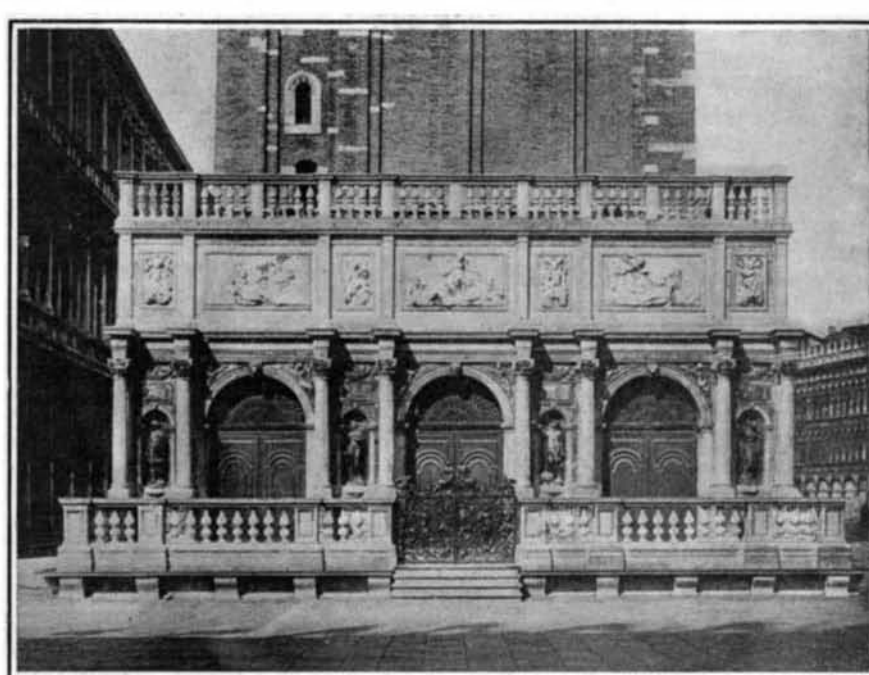
Three of the Statues from the Logetta; Now Restored.



Sectional View of the New Foundations, the Logetta and the Lower Portion of the Tower.\*



The Fine Balustrade of Gai in the Logetta.



The Celebrated Logetta and the Base of the Campanile Before It Fell. Note the Cracks in the Wall.

#### THE REBUILDING OF THE CAMPANILE AT VENICE.

granted to France a concession to build a railway from the Tonkin frontier to Yunnan Fu, the capital of the southwestern province, a distance of about 280 miles. Labor and climatic difficulties, as well as a change, in 1904, of the original tracé of the line, have had much to do with the delay, but work is now proceeding all along the new route, and it is expected that the railway will be open as far as Mengtzu in 1907, and be completed to Yunnan Fu, the terminus, in 1908.

years previously to the occurrence of its fall in 1902. It is gratifying to know that the reconstruction of the tower, at least as far as its external appearance is concerned, is to be entirely in accordance with its original lines and dimensions. The structure was 322 feet in height, and it was built on a foundation of closely-driven piles, upon which was laid a foundation of solid masonry some 15 or 16 feet in depth. When the campanile fell, this foundation masonry was not

inally completed, showed above the level of the square. In building the walls of the tower, the original plans will be followed with great fidelity, and the internal spiral pathway will be retained; but for the convenience of the public an electric elevator will be built in the center of the tower. Fortunately, the authorities were able to recover from the mass of debris all the

\*The short piling is the original work; the longer piling and new masonry has been added during the reconstruction.