miral Hichborn are: First, the danger of all four guns being disabled by one successful shot; second, the reduction in the number of the 8-inch gun positions, as compared with the "Oregon" type, and the attendant danger that in the last stages of a hard fought action no 8-inch fire would be available on account of disablement; and thirdly, the lack of mobility in the 8-inch guns, arising from the fact that they must be trained with the 13-inch guns beneath them, whereas it might be desirable to use the heavy guns on one portion of the ship and the lighter guns on some other.

All three of the above objections are of the "too-many-eggs-in-one-basket" kind, and it seems to us that while theoretically they are plausible, the teachings of our late naval war show that they may be pushed entirely too far. If the positive advantages of the system are evident—and they are admitted to be—these theoretical limitations may easily be exaggerated, as the following considerations will show. The argument against the concentration of four guns in one turret only possesses weight if the possibility of the turret's being hit is great. The engagements of the Spanish-American war prove that the risk is extremely, indeed ridiculously, small. In the naval battle off Santiago official statistics show that the total number of shots fired by the United States ships, exclusive of those from the "Gloucester," was 8,060. The Board of Naval Officers who examined the ships after the battle found that the total number of hits on the four Spanish vessels was 120, or about 1·5 per cent. Of these 120 hits, three only were recorded upon the turrets, which carried the main battery of 11-inch guns, so that our gunners, whom we consider to be the best in the world, while engaging the enemy at what may be considered a normal fighting range, had to fire 2,687 shells to score one hit upon the main turrets. We are considering, however, the question not merely of hitting but of disabling the turrets, and we find that of the three hits recorded, only one of them was made by an armor-piercing gun. Consequently we may assume that if a "Kearsarge" had been included among the ill-fated ships of the Spanish squadron at Santiago, she would have passed through that four hours' bombardment by the finest gunners in the world at the risk of receiving one vital blow out of 8,060 projectiles which fell upon the fleet.

Evidently we may put all of the eggs we may wish into the double-turret basket without much fear of their being broken.

Although theoretically it would be desirable to train the 13-inch guns on the barbettes, turrets and belt armor, and the 8-inch guns on the lighter casemate armor, the moral of the battle of Santiago is that such a nice selection will never be made by the gunner, who will be more concerned with hitting the target at all than with the determination of where he will hit it. At closer ranges, of course, more accurate marksmanship will be possible, but the present indications are that naval battles will be fought at long range, and that they will be decided more by the decimation of the crews than by the destruction of the ship itself. The trend of future construction will be in the direction of less armor, more guns, and an increased rapidity of fire. The double turret, by reducing the number of separate armored positions and permitting more weight to be put into guns, conduces very materially to this result.

FRENCH PRIZES FOR SCIENTISTS AND INVENTORS.

Scientific work is greatly encouraged in France by the prizes which have been established by the Académie des Sciences, most of these being founded by legacies which have been left for that purpose. The Montyon prize is an annual award of 700 francs, to be given to the person which the academy judges most worthy on account of an invention or improvements of instruments useful in agriculture, the sciences, or the mechanical arts. M. Louis La Caze has left to the academy a sum which yields 15,000 francs yearly, this being divided into three prizes, to be awarded every two years. One of these is given to the author of a work which has contributed the most to the progress of the science of physiology. The other two are for the best works on physics and chemistry. This prize is open to foreigners, and will be awarded at the public meeting of the academy in December, 1901. M. Henri W. Wilde has given the sum of 137,500 francs, which constitutes an annual prize of 4.000 francs to be awarded to the person who brings out a discovery or work in the branches of astronomy, physics, chemistry, geology, mechanics, etc., which is considered worthy of recompense by the academy. For this, the manuscripts or memoirs should be deposited with the secretary before the first of June, 1900. The Arago gold medal has been awarded yearly by the academy since 1887; it is given for a discovery or scientific work which is judged worthy of obtaining this honor. The Tremont prize is an annual sum of 1,100 francs, and is designed to aid a scientist or engineer, in the progress of whose work an assistance is necessary in order to obtain a useful result. At the annual meeting of the academy this prize will be awarded to the person who presents, in the course of the year, a discovery or improvement which best responds to the idea of the founder. The Gregnar annual prize of 4,000 francs is designed to aid a scientist who has already done important work, and whose researches could be better carried on by the help of this award. Madame Jean Reyraud has left an annual sum of 10.000 francs, to be awarded each year by one of the five sections of the academy. This is given for a work or series of researches of an original and useful character. The Jerome Ponti prize of 3,500 francs is awarded every two years for an important scientific work. The Leconti prize of 50,000 francs is awarded every three years for a new discovery in mathematics, physics, chemistry, etc., or a practical application in these branches which gives results superior to those already known. Electrical work has a special prize founded by Gaston Planté; 3,000 francs is awarded every two years for a discovery or important work in this branch. The two latter prizes will be given next year. Another prize relating especially to electricity is that founded by M. Kastner-Boursault; it is an annual sum of 2,000 francs, to the author of the best work upon the applications of electricity to the arts, industry or commerce.

These awards are made at the end of the year, at the public session of the academy, and in general, all communications should be made before the first of June of that year. A resumé of the work should be given, and it should also be indicated in what part the essential features of the discovery, etc., are to be found.

APPLIED SCIENCE IN MODERN WAR.

One of the notable circumstances connected with the present war in South Africa has been the wide and varied application of the results of modern science in regard to it. Setting aside altogether those of a purely military character such as firearms, quick-firing and machine guns, there are many other directions in which the influence of applied science may be recognized. We now perform a considerable portion of our scouting by balloons, and transmit the results of observations obtained from an altitude, supplemented by the aid of the field glass, to troops advancing or operating on the field. The best telescopes and an abundance of field glasses are always in requisition. By means of wireless telegraphy, and with the aid of kites communications has been successfully established between various stations occupied by the British troops in the theater of war in Africa. As regards the sanitary and medical service, says The London Lancet, stricter application of the rules of practical hygiene has obtained, resulting in a remarkably progressive improvement in the health of the soldiers in the field in the successive expeditions, which have taken place since the time of the Crimean war. Infective wound diseases, which in the past were a veritable scourge among the wounded in military hospitals, have been practically banished from them by universal and scrupulous attention to cleanliness and by the rigid use of antiseptic dressings in wounds and injuries, and by the performance of all operations while patients were under the influence of anæsthetics. The use of the Roentgen rays has enabled the surgeons to detect the presence and exact site of any missile or foreign body. These are some of the innovations for which applied science is responsible.

THE YOUNGEST SUBSCRIBER.

The SCIENTIFIC AMERICAN is the constant recipient of letters from the "oldest subscriber," and we are always pleased to hear from him. His age is variable but the term of his subscription invariably dates back to somewhere between the year 1845 and 1848. Some day we may seriously set out to determine just who is the most venerable of these correspondents; indeed, we would have done so long ago were it not that we feared to interrupt and discourage a type of correspondent that lies very near to the editorial heart.

The subject has received a novel variation in the shape of a letter from a Master William Arnold, who, while he may not be the oldest, is certainly the youngest subscriber. He writes, "I am only six years old, but I like to look at the pictures and hear the paper read to me. My brother Paul, who is eleven years old, reads to me, and sometimes papa."

DEATH OF ST. GEORGE MIVART.

Dr. St. George Mivart, who was formerly lecturer on zoology at St. Mary's school and professor of biology to the University of Louvain, died on April 1, at the age of seventy-two. The deceased was a scientist of a high order. He wrote a number of remarkable books, such as "Genesis of Species," "Nature and Thought," "Types of Animal Life," "The Cat," "An Introduction to the Elements of Science," "Man and Apes" and the "Origin of Human Reason." Dr. Mivart's name has recently been prominently before the public in a religio-scientific controversy.

THE Russian Agricultural Department has recently discovered in Kirghiz Steppe on the eastern shore of the Caspian Sea immense naphtha springs of a quality which is said to be equal to the best American naphtha.

PARIS EXPOSITION NOTES.

The New York Public Schools will be represented at the Paris Exposition by an interesting exhibit. A number of moving pictures will be taking showing the assembly and dismissal of pupils, the school workshop in operation, the cooking class at work, kindergarten games, gymnasium scenes and recess amusements. A hall has been set aside on the banks of the Seine to show the work.

One of the attractions of the Paris Exposition is that known as the "Globe Céleste," consisting of an immense sphere of 46 meters in diameter, supported by four ornamental masonry pillars, the top of the foundation being surrounded by a terrace which has a height of about 40 meters from the ground. On the outside of the sphere are represented the constellations in their appropriate order, with the mythological figures proper to each, the whole being illuminated. The interior is reached by a stairway or electric elevators, and the spectator finds himself in the center of a second sphere 35 meters in diameter. In an artificial firmament are represented the sun, planets, nebulæ, etc., by means of electric bulbs of greater or less intensity and of various colors. In the center an earth of 8 meters in diameter turns on its axis and will accommodate one hundred spectators. By this rotation the sun and planets take the required movement; the moon revolves around the earth and changes its phases, and eclipses are also represented. Although these movements must be relatively rapid, they are proportionately exact. A great organ has been installed in the sphere, and space has been arranged for an audience of two thousand. In this will be given a series of organ recitals by celebrated composers. The exterior of the sphere is surrounded by an oblique circle representing the zodiac; this is arranged to form a staircase by which the visitors may circulate around the globe and obtain the view from the top.

Among the large dynamos which have been installed to furnish the lighting and power for the Paris Exposition, those of Germany are especially noteworthy. The German section takes up one end of the large dynamo building allotted to the foreign machines, and here are to be seen a number of alternating current dynamos connected to engines, most of which are of the upright type. Among the largest of the engines is that constructed by Borsig, of Berlin; it is of the upright compound type, and gives about 2,500 horse power. The dynamo is connected directly to the shaft of the engine, and has been furnished by Siemens and Halske, of Berlin. It is of the three-phase alternating current type, the field being mounted upon the interior flywheel, this consisting of a large ring carried upon spokes; upon the ring are mounted the field coils. The exterior armature consists of a large ring surrounding the field and is built up of laminated iron. The armature winding is made up of a series of copper bars placed in slots on the interior surface of the crown. Connected with a similar engine of 2,000 horse power is another large dynamo furnished by Schuckert and Company, of Nürnberg. Its construction is somewhat similar in appearance and electrical design to the former, the revolving field being mounted directly upon the shaft of the engine, and the exterior armature ring having its circuit made up of copper wire wound in slots. The Helios Company have a large alternator of similar design and capacity connected to a horizontal compound engine.

One of the remarkable features of the Foreign dynamo room is the great electric traveling crane of 25 tons, which has been installed by Carl Flohr, of Berlin, this being necessary in order to mount the large and heavy pieces of the machines of this section. It takes somewhat the form of the building, having two massive uprights of iron construction, about 28 meters apart, joined at a height of 12 meters by a horizontal beam which supports the traveling carriage. Above the beam the sides of the crane are joined by two parabolic segments forming an arch which takes the form of the roof of the building. The arch is braced at its apex by a trellis-work column descending to the horizontal beam. The uprights are spread out at the bottom, forming a wide base, and are supported upon rolling carriages, which run upon a double rail placed at either side of the building. The carriages are made as narrow as possible, to avoid taking up an unnecessary amount of space, and roll upon a series of small wheels placed one behind the other. The track is formed of two railroad rails placed side by side, having between the webs a rack in which engages the pinion of the crane. Half way up the side of the crane is a large platform which contains the necessary controlling apparatus for the motors. The carriage which travels upon the horizontal beam has a motor capable of lifting 25 tons to a height of 12 meters and a second smaller motor for the transverse movement of the carriage. A third motor is necessary to move the crane as a whole. The circuits of all these motors are brought to the switchboard upon the platform, and by a series of rheostat and controllers the attendant may regulate the movement of the heavy pieces of machines with great precision.