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 Edition (Established 1885). ..... 2.50 "
Scientific American Export Edition (Established 1878)..... 3.00 "

The combined subscription rates and rates to foreign countries will be furnished upon application.
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MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, APRIL 14, 1900.

NEW YORK'S WATER SUPPLY AND THE RAMAPO CONTRACT.

New York is in no danger of a water famine, alarmists' rumors to the contrary notwithstanding. In our recent discussion of this subject we showed that with an average total annual supply of 147,000,000,000 gallons, the consumption is only 92,000,000,000 gallons, and this with a daily per capita consumption probably larger than that of any other city in the world. It was also shown that the Boroughs of Brooklyn and Queens were amply supplied, the present daily consumption, though not as large as that in Manhattan and the Bronx, being, nevertheless, more than is necessary for the actual needs of householders; for, in the opinion of the Water Commissioners, the consumption, particularly in Manhattan and the Bronx, could be enormously reduced by the simple expedient of putting in self-closing faucets and the adoption of other means of reducing the present wilful and stupid waste of water. On the other hand it is a fact that the building of reservoirs and aqueducts is, in the nature of things, costly and tedious work, and, therefore, it is expedient that provision for increased water supply be made many years in adavnce of present necessities.

From our recent review of the subject, which will be found in our issue of March 24, it is seen that practically the entire supply of water is drawn from works belonging to the city itself. Taken as a whole the present system is an extraordinarily good one, and justifies the citizens in the determination that any further enlargement of the water supply shall be made at the public expense and owned and controlled by the city.

During the past few months New York City has been not a little agitated by the discovery that an organization known as the Ramapo Water Company which, for the past seventeen years, has been engaged buying up all the available sources of water supply throughout the State and in securing legislation designed to make it secure in the monopoly thus acquired, was about to obtain a contract from the Water Commissioners which would force the city to take its future supply of water from this company, paying therefor the enormous sum of $200,000.000. In contemplating this extraordinary proposition, one is impressed both with the audacity and magnitude of the scheme, and the silence and subtlety with which, through all these long years, it has been carried out.

The work of securing and making safe this monopoly had to be prosecuted in two different fields. On the one hand surveys had to be made of the various water sheds which might, in any way, be made contributory to the city, and also of the possible routes which might be followed by the aqueducts for conveying the water. The other field of operations lay within the halls of the Legislature, and in both fields the promoters of the Ramapo scheme appear to have been only too successful. They have secured options upon practically all the sources of water supply, and they have secured the right of way for pipe lines and aqueducts, paying therefor the nominal sum ordinarily required in such purchases. In the Legislature they have succeeded in taking away from the city the right of eminent domain, or, in other words, the city's right to condemn land for water supply purposes. Not only so, but the Ramapo Water Company has been granted special powers of condemnation not possessed by any other company eligible to contract with this city. The present situation resulting from these provisions as stated by the Merchants' Association of New York is as follows: First, an adequate water supply for the city of New York can be procured only by use of public powers to condemn water rights; second, the city is deprived of the power to condemn, or to buy indispensable water rights; third, no company eligible to contract with the city has been granted the power to condemn water rights, with one exception; fourth, the Ramapo Water Company alone has the public powers to condemn water rights; and only by contracting with the Ramapo Water Company to use those powers on its behalf can the city of New York obtain more water,

By the terms of the notorious Ramapo contract, the company has to deliver, by a gravity system of transmission, 200,000,000 gallons of water every day for a period of forty years from and after the first day of some specified month in the year 1902, the water to be paid for at the rate of $70 per million gallons. In view of the fact that the present supply of the greater part of this city is at last 100 per cent greater than the actual necessities of the city, it is seen how iniquitous would be the signing of a contract saddling the city with an additional and altogether superfluous supply, which is almost as large as the actual amonnt now required for the daily use of the city.

Some human rights there are, whether of a public or a private nature, which need no definition, and among these, surely we may place the right of a city to control its own supply of one of the primal necessities of life. That any private corporation should systematically set itself to buy up the water rights of the second greatest city of the world, just as the real estate speculator buys up the outlying farms of some booming Western city, is not to be tolerated.

Relief is being sought through the Legislature, and we are much pleased to see that in spite of the inevitable veto of the distinguished Mayor of this city, Governor Roosevelt has attached his signature to the Fallows Anti-Ramapo bill, which restricts the powers claimed by the Commissioner of Water Supply of the city of New York, forbidding him to enter into any water contract without the approval of the Board of Public Improvements and the Board of Estimate and Apportionment, and the separate written consents of the Mayor and Comptroller. Further legislation has been sought in the Morgan bill, which aimed at the restoration to the city of New York of its rightful powers of eminent domain, whereby it should once again been abled to obtain any needed water supply by the exercise of the power of condemnation. Although the bill was defeated, it seems to us that the restoration of these rights would throw an additional and much-needed safeguard around the interests of the city.

THE PROPOSED DEPARTMENT OF COMMERCE AND INDUSTRY.

The wonderful progress which we have made in the last few years in the increase and extension of our export trade, has naturally resulted in the desire of our legislators to foster our commerce by all possible means. The proposal to establish a new executive department to be known as the "Department of Commerce and Industries," the head of which shall hold a seat in the President's cabinet, seems a wise one. In none of the departments of the government have we any bureau or division of the public service to which is committed the supervision of the manufacturing and mining interests of the country. In view of our great progress and our development in manufacturing industries, the products of which now far exceed our ability to consume at home; in view of the urgent necessity of securing more extensive markets abroad, it must be apparent to anyone who gives the subject the least thought that there is an urgent demand for an establishment of a department of the public service to have charge of, and aid in our industrial development, and to secure better and more extensive markets abroad. This fact has been recognized for many years by all the principal commercial bodies throughout the country, and there now seems to be an urgent demand in the industrial world for such a department. Most of the other governments have something of the kind. England has her Board of Trade; France, her Minister of Commerce, Industry and Telegraphs; The Netherlands, a Minister of Public Works and Commerce; Austria Hungary, a Minister of Commerce and National Industries; Italy, a Minister of Commerce, Industry and Agriculture; Spain, Portugal, and Russia also have similar officers. In all of these governments the fact is recognized that a department of this kind is essential and necessary for the care, promotion, and development of commerce and manufactures. The United States, in order to be on a footing of equality, and in order to be fully equipped to enter the competitive field with the strongest commercial nations ought to take a lesson from and be guided by these examples. In order to make such a department comprehensive and effective, and in order fully to equip it with the necessary appliances to execute its great task and purpose, all branches and departments of the public service relating and germane to the subject of commerce, manufactures and other industries ought to be vested in it.

Bills with this end in view have been introduced in both the house and the Senate, the latter being fuller and more elaborate, and it is the one likely to be considered in preference to the other. There is little prospect that the bill will be considered this session, but it is expected that it will be passed the next session of this Congress.

The Senate bill number 738 provides for a cabinet officer and an assistant secretary, and that the new department shall have general jurisdiction over the foreign and internal commerce of the United States, except in so far as regards the revenue and collection of customs. It shall also have general jurisdiction over all matters pertaining to transportation facilities by land or water, except in cases under the jurisdiction of the Interstate Commerce Commission. It shall have general jurisdiction over the Geological Survey, the mining industries, and the fish industries, as well as everything pertaining to the manufactures of the United States, including the securing of foreign markets. It is also intended that the new department shall have jurisdiction over Patents, Trade Marks and Copyrights.

Many bureaus and offices would be transferred from their old departments to the new one. Thus, the Treasury Department would have to give up the Life Saving Service, the Light House Service, Marine Hospital Service, the Steamboat Inspection Service, the Bureau of Navigation and the United States Shipping Commissioners, the Bureau of Immigration, the Bureau of Statistics, as well as the United States Coast and Geodetic Survey. From the Interior Department would be transferred the Commissioner of Railroads, the Patent Office, the Census Office, and the Geological Survey, and from the State Department, the Bureau of Foreign Commerce, which would be consolidated with the Bureau of Statistics transferred from the Treasury Department. The Director of the Geological Survey would be the Chief of a new Bureau of Geological Survey and Mining Industries. The bill also provides that the Department of Labor, and the office of the Commissioner of Fish and Fisheries be transferred to the new executive department. It will readily be perceived that the bureaus, departments, and branches of the public service that are transferred to the new department are all intimately connected with, and directly pertain to the subject of commerce, manufactures and the other industrial enterprises committed to the new department. It is estimated that the changes brought about by the transference of the various bureaus and the salaries of the new officers would not be greater than $50,000 per annum.

The secretary and the assistant secretary are to be appointed by the president and the salaries are to be respectively $8,000 and $4,000 per annum.

The transference of the Patent Office from the Department of the Interior to the Department of Commerce and Industries, would be a curious and interesting experiment. Provided that the internal affairs of the Patent Office are not interfered with, it seems as though it made little difference under which department it is classified, if it had proper representation in the Cabinet councils.

THE DOUBLE-TURRET SYSTEM ON TRIAL.

The favorable results of the recent trial of the double turrets of the "Kearsarge" can scarcely be overestimated in the far-reaching influence which they will exert upon the future designs of United States warships. Although the tests are not final, they were so far successful as to clear up many of the doubts which had existed as to the practicability of this novel and daring method of mounting the main battery of a warship.

The history of the double-turret controversy shows that the objections to the design may be summed up as of two kinds, structural and military. The structural objections which were raised chiefly, as they properly should be, by the Construction Department, have been met and successfully overcome by our naval constructors, who stated early in the history of the controversy that, if the turrets were finally approved on military grounds, they could and would overcome the mechanical difficulties involved in working out the installation. Briefly stated the structural objections are: The concentration of weight so near the ends of the vessel, tending to impair her seaworthiness; the risks in docking due to this concentration; the complication involved in concentrating at one point the large ammunition supply necessary for the four guns, and in the juxtaposition of the four ammunition hoists and the necessary power to work them; and last, and perhaps the chief of all, the abnormal stresses to which the substructure of the double turrets would be subjected from the simultaneous recoil of four heavy guns. These difficulties, however, have been cleverly met and removed.

The military objections might seem, strictly speaking, to be a matter for the exclusive consideration of the line officers who command and fight the ship. Indeed, the argument is advanced by them that as the structural side of the question has been completely solved, the problem has passed out of the hands of the Construction Department, and the determination of the value of the double-turret system and of its incorporation as a permanent feature in future battleships should be left to the officers of the line. We cannot say that we agree with this position, for it seems to us that a naval constructor has not only to devise proper means for disposing and protecting the guns, but he should be entitled to determine whether those dispositions are such as will secure the very best offensive and defensive results.

The military objections as expressed by Rear-Ad

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.